SITKA BOAT HARBOR HERRING SPAWN DEPOSITION STUDY

FINAL REPORT

WITH 1997 AND 1998 SURVEY RESULTS

By

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and
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ABSTRACT

A study was conducted in Sitka Sound, Alaska to monitor spawning success of Pacific herring (*Clupea harengus pallasi*) before and after installation of a boat harbor. Two years of data (1993, 1994) were collected prior to construction, one year during construction (1995) and three years (1996-98) after completion of the project. Spawning success was measured as miles of shoreline receiving herring spawn, egg density, and total egg deposition. Five permanent transects were positioned within the proposed boat harbor location. A control area consisted of that portion of Sitka Sound that received herring spawn in any given year, excluding the proposed boat harbor. Control transects were randomly placed each year and were part of a regular annual herring stock assessment program conducted by the Alaska Department of Fish and Game. Habitat data for bottom type and vegetation type were collected in addition to egg deposition data. Results of the study indicate that there may have been a decrease in herring egg deposition and egg density within the boat harbor after 1995. Additionally, there may have been shifts in habitat type.

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) entered into a cooperative agreement with the U.S. Fish and Wildlife Service (USF&WS), agreement COOP-93-065 number 1448-0007-93-7770, in the spring of 1993 to document the extent of herring spawning activities within the boundaries of the proposed small boat harbor at Sitka, Alaska. The monitoring study is part of the U.S. Army Corps of Engineers project plans for the harbor and will be used to determine if construction and operation of the harbor will have adverse effects on traditional spawning within this area. Construction of the harbor was started during the fall of 1994 and terminated during the herring spawning time period in March of 1995. The pre-impact surveys covered by this agreement occurred in April 1993 and 1994. The 1995 survey occurred with the breakwater almost completed but no additional structures in place. The 1996 survey occurred with the breakwater complete and most of the finger floats and pilings installed. Surveys conducted in 1997 and 1998 took place after the breakwater and harbor were completed.

OBJECTIVES

The study is designed to document the habitat and herring spawning patterns prior to the construction of the harbor and to provide post-construction monitoring. Aerial surveys were conducted to document herring spawn timing and spawn geographic distribution of the greater Sitka Sound herring population. Habitat and herring egg densities within the proposed breakwater boundaries were described through examination of permanent experimental sites. Additionally, a control site consisting of regular survey data on habitat and egg density in Sitka Sound, outside of the boat harbor, was monitored through randomly placed transects. Data collection was possible for two years prior to construction, continued through the year of construction, and three years of data have been collected since completion of the harbor.

METHODS

Aerial and Skiff Surveys

Aerial and skiff surveys are the standard method for documenting timing and location of herring spawning activities in Southeast Alaska. Surveys are conducted on a daily basis during the time herring are expected to be spawning in the area. Surveys are generally conducted by Department of Fish and Game employees, with the aid of a small, fixed-wing aircraft or skiff. A daily log of herring distribution and spawning activity is maintained with shoreline lengths of herring spawning activities recorded on 1:40,000 scale NOAA navigation chart notes 17326 and 17324. The annual total miles of spawn is a sum of the amount of shore receiving spawn for the season regardless of multiple days of spawning along the same length of shoreline.

Spawn Deposition Sampling

The spawn deposition survey technique for estimating numbers of herring eggs by spawning area has been used in Southeast Alaska since 1976. It has become the most common method of estimating herring escapements in recent years and is one of the major components of the age-structured analysis (ASA) method of projecting a subsequent year's forecasted return of spawning biomass.

The basic field sampling procedure entails two-person scuba teams swimming along line transects and recording visual estimates of the number of eggs within a 0.1 meter^2 sampling frame placed on the bottom at five-meter intervals along the transects. Because the frames (i.e., samples) are spaced equidistantly along transects, the record of the number of frames along transects is also used to compute transect length. Along each transect, diver one swims the specified inter-frame distance and places the frame on the bottom in a haphazard fashion (i.e., to minimize or avoid bias). Diver one then visually estimates the number of eggs within the frame boundary and relays the estimate to diver two to be recorded on a preprinted data form. diver two records the sequential number of the sample, depth, bottom type, percent of vegetative cover and vegetation type. If time and conditions allow, diver two also estimates the number of eggs for comparison with diver one and as a training exercise for diver two.

Starting points for transects in the control area are located randomly along the shore in areas where aerial or skiff surveys indicated probable spawn deposition. Transects are oriented perpendicular to the shoreline. Transects extend from the intertidal to either 15 meters of depth or until no further egg deposition is observed. Transects are extended above the waterline as far as egg deposition occurs. Dives are generally limited to 15 meters because deeper dives severely limit total bottom time for scuba divers and pose safety risks when conducted repetitively over several days. In addition, little if any herring egg deposition normally occurs deeper than 15 m. The number of transects for Sitka Sound was estimated from previous surveys to achieve a statistical objective of producing an estimate of mean egg density with a standard error within +/- 20% of the mean.

Visual Estimate Correction

Since visual estimates, rather than actual counts, of eggs within the sampling frame are recorded, measurement error occurs. To minimize the influence of measurement error on final estimates of total egg deposition, diver-specific correction coefficients (h_i) are used to adjust estimates of egg density. Correction coefficients are estimated by visually estimating the number of eggs within a sampling frame and then collecting all of the eggs within the frame for later enumeration in the laboratory. To collect the eggs, divers either remove them from the substrate (e.g., rock) or collect the vegetation (e.g., kelp) for later removal of the eggs.

Estimates of Total Egg Deposition

Total egg deposition for a particular spawning ground (t_i) is estimated as:

$$t_i = a_i \bar{d}_i , \qquad (1)$$

where a_i is the estimated total area (m^2) on which eggs have been deposited and $\bar{d}_i$ is the estimated mean density of eggs (eggs/m^2) at spawning area i. The total area on which eggs have been deposited (a_i) is estimated as:

$$a_i = l_i \bar{w}_i , \qquad (2)$$

where l_i is the total meters of shoreline receiving spawn (determined from aerial and skiff surveys) and $\bar{w}_i$ is the mean length of transects conducted at spawning area i.

The mean density of eggs/m^2 at area i ($\bar{d}_i$) is estimated as:

$$\bar{d}_i = \left[\frac{\sum v_{hij} c_{hk}}{\sum m_{ji}} \right]^{-0.1} , \qquad (3)$$

where v_{hij} is the visual estimate of egg numbers by diver h, at area i, quadrat j. The c_h term refers to a diver-specific correction coefficient to adjust visual estimates made by diver h for substrate k, and m_{ij} is the number of quadrats visually estimated at area i. Divers visually estimate egg density within 0.1 m quadrats. The -0.1 exponent expands the mean density from a 0.1 m^2 to a 1.0 m^2 unit basis. Diver-specific correction factors (c_h) are estimated as:

$$c_h = \frac{\bar{k}_h}{\bar{v}_h} , \qquad (4)$$

where $\bar{v}_h$ is the mean visual estimate of egg numbers for diver h and $\bar{k}_h$ is the mean laboratory count of egg samples collected from quadrats visually estimated by diver h.

Spawning Biomass Estimation

The total number of eggs per spawning area is a key element used in forecasting herring spawning biomass. In Sitka, the estimate of total eggs is one parameter used in ASA modeling, along with age composition, maturity, mortality, and growth data, to estimate future returns. The final 1998 Sitka Sound herring spawning return biomass estimate and the subsequent forecast return for 1999 will be determined by ASA. For comparison purposes, a 1998 spawning biomass for the study area and control can be directly estimated from the number of eggs as:

$$b = \frac{ti}{L * 102{,}567{,}376}, \qquad (5)$$

where: b = estimated total spawning biomass in short tons.
(102,567,376 is the 1998 eggs to spawning biomass conversion).

L = egg loss correction factor (0.9) that accounts for an estimated 10% egg mortality between the time eggs are deposited and spawn deposition surveys are conducted.

Fecundity

To better estimate the relationship between population size and number of eggs deposited on the spawning grounds, a fecundity study was conducted in Sitka in 1998. Although not part of the cooperative agreement between the State and the USFWS, the relationship between the number of eggs observed on the spawning ground and the biomass of herring required to deposit that number of eggs is critical in our understanding of herring population dynamics for the Sitka Sound spawning stock. The spawning biomass for 1998 was calculated from this data.

RESULTS AND DISCUSSION

1997 and 1998 Results

Aerial and Skiff Surveys

During the 1997 season, aerial surveys began on March 10, 1998 in the Sitka area. The first active spawn was observed on March 19 on the eastern side of Hayward Strait. Significant spawning occurred between March 23 and March 31 in the areas around Kasiana Island, Apple Island, Halibut Point Road, Middle Island, Japonski Island, Jamestown Bay, and Crescent Bay (Appendix A). The total shoreline (including inside harbor) receiving spawn was estimated at 33 nautical miles.

During the 1998 season, aerial surveys began on March 10, 1998. About 0.3 mile of active spawn was recorded on the southwest side of Middle Island on March 19. A major spawn began on March 21 with fourteen nautical miles reported, but peaked on May 23 with 35.7 nautical miles that day (Appendix B). The total spawn tallied 62.25 nautical miles, including one nautical mile in the boat harbor. The entire 1.0 nautical mile of shore within the boat harbor study area received spawn in both 1997 and 1998.

Visual Estimate Correction

Visual estimates and subsequent egg counts in the laboratory were obtained from Department of Fish and Game divers that participated in the 1997 Sitka Sound survey (Table 1). In 1998, calibration samples were not collected in Sitka Sound. The final visual estimate calibration data used to determine number of eggs for the 1997 and 1998 surveys were based on the accumulation of all samples taken since 1982; it is diver and substrate-specific, but not stock-specific. Individual diver corrections (made by comparing laboratory counts to visual estimates) range from 0.74 to 2.07 (Table 2a,b). Vegetative substrates, which were sampled for calibration, included eelgrass, *Fucus,* hair kelp, and large brown kelp. Other vegetation types were observed during the survey (Table 3) and associated estimates were adjusted using a calibration factor (called "other") based upon a group of less commonly sampled vegetation species (Table 2a,b).

Estimates of Total Egg Deposition

The 1997 survey occurred during April 7-9. Permanent transects inside the boat harbor were surveyed on April 8-9 (Figure 1a). A total of 20 randomly selected transects were located within the 33 miles of spawn (Figure 2a), resulting in 1.65 nautical miles of beach with spawn per transect. The average transect length inside the harbor was 185m, with a density of 138,098 eggs/m^2. The resultant corrected escapement within the boat harbor was 522 short tons. The average transect length outside the harbor was 94 meters, with a density of 384,826 eggs/m^2 resulting in a corrected escapement of 26,604 short tons (Table 4a).

The 1998 spawn deposition survey began with the five permanent transects within the small boat harbor on April 1 (Figure 1b). Surveys outside the boat harbor area were performed from April 1 through April 3. A total of 35 randomly selected transects were completed (1.75 nautical miles of beach with spawn per transect) for the 61.25 nautical miles of spawn outside the boat harbor that had been deposited prior to April 3 (Figure 2b). The survey for the boat harbor had an average transect length of 165 meters, with an average density of 277,464 eggs per square meter. The resultant boat harbor escapement estimate is 942 short tons (including a 10% egg loss factor). For the area outside the boat harbor (35 transects, 61.25 nautical miles of spawn) the average transect length was 81.4 meters with an average density of 340,622 eggs per square meter. The resultant escapement estimate for Sitka Sound outside the breakwater was 34,897 short tons (Table 4b).

Individual transect data with the number of eggs per quadrat, vegetation type, and depth is included for the boat harbor study (Tables 5 and 6). The daily aerial and vessel herring spawning activity survey log is also included (Appendices A and B).

Fecundity

Fecundity estimates were calculated for the Sitka herring stock in 1998. On March 18 and 19, 101 mature female herring were sampled to determine the fecundity to weight relationship (fecundity=226.139*weight - 3383) which was used to calculate the 1998 spawning biomass to egg conversion of 102,567,376 eggs/ton of spawners (Figure 3), and ultimately the escapements inside and outside of the Sitka boat harbor. The average fecundity was 27,350 eggs. A straight least-squares regression model was used to define the relationship in 1998. This is in contrast to the weighted least-squares model used in 1996, which was necessary to improve model fit to the data.

Summary, 1993-1998

Data collected during the years 1993 through 1998 show a general decline in amount of herring egg deposition inside the Sitka boat harbor when compared to the remainder of Sitka Sound. Total egg deposition within the harbor was greatest in 1993 and least in 1997 (Table 7). Although total egg deposition in Sitka Sound (including harbor) decreased between 1993 and 1994, the proportion of total egg deposition which occurred in the harbor remained at approximately 5%. Beginning in 1995 (the year construction began) the proportion dropped to 2.7% and remained below this level for the remaining years of the study. This occurred despite fewer shoreline miles of spawn in Sitka Sound during 1995-1997 than during 1993 and 1994 (Figure 4).

Herring egg densities inside and outside the boat harbor were most similar during 1994 and 1995, but diverged starting in 1995 and continuing through 1998 (Figure 4). The trend of egg density is similar both inside and outside of the boat harbor (i.e. corresponding increases or decreases during the same year). The observed patterns of both total egg deposition and egg density indicate that spawn deposition inside the boat harbor continues to be positively correlated with that outside the harbor, but in different proportions for the time periods 1993-94 and 1995-98.

Slight changes were observed in habitat (bottom type and vegetation type) during 1994 through 1998. This was determined by plotting the proportion of habitat types observed over each transect as well as for pooled transects (Figures 5 and 6). The proportion was taken as the number of times a habitat type (primary) was observed in a sampling frame divided by the total number of sampling frames over the transect (see Appendix D). The most notable changes in bottom types are increases in mud, silt, and cobble and decreases in sand and rock. Notable changes in vegetation type were increases in *Fucus* and filamentous algae and a decrease in large brown kelps. It is difficult to ascertain whether these observed changes were actual. The data collection methodology imposes great limitations to what can be assumed about the habitat data. The data may only be capable of revealing major shifts in habitat type. To accurately monitor changes in habitat would require complete mapping of habitat type along transects. In addition, re-survey of precisely the same transect would provide the most credible information.

Table 1. Individual spawn deposition diver calibration estimates, 1997.

Date	Area	Observer[a] Visual Est. (in thousands) BD	DG	BL	Substrate[b]	Total Vol. Egg Displacement (ml)	Eggs/ml	Lab Est. in 1,000s[c]
8-Apr-97	Sitka	45	40	35	FUC	330	145	49
8-Apr-97	Sitka	160	120	85	FUC	1040	185	193
8-Apr-97	Sitka	10	8	7	FUC	123	256	32
8-Apr-97	Sitka	360		450	HIR	2189	227	498
8-Apr-97	Sitka		420		HIR	2420	400	969
8-Apr-97	Sitka	130	120	120	HIR	1065	455	486
8-Apr-97	Sitka	30	50	25	HIR	161	244	40
8-Apr-97	Sitka	30	40	40	LBK	183	294	55
9-Apr-97	Sitka		800		ELG	1806	312.5	565
9-Apr-97	Sitka	230	240	250	ELG	640	270	174
9-Apr-97	Sitka	150	160	120	ELG	460	270	125
9-Apr-97	Sitka	600		850	ELG	1680	333	560
9-Apr-97	Sitka	180	180	200	LBK	670	357	240
9-Apr-97	Sitka	50	37	70	LBK	340	323	111

[a] BD (Bill Davidson), DG (Dave Gordon), BL (Brian Lynch).

[b] FUC=Fucus spp.
HIR=sea hair (Desmarestia spp.)
LBK=large brown kelp (Laminaria spp., Pleurophycus garderi, Cymathere triplicata, Costaria costata, Agarum spp.(if mixed), Alaria spp.)
ELG=eel grass (Phyllospadix spp. or Zostera marina)

[c] Correction is equal to the laboratory estimate divided by average visual estimate.

Table 2a. Southeast mean annual[a] herring spawn deposition diver calibration ratios (lab:visual), 1997 (based on data from 1982-1988, 1993-1998).

	SUBSTRATE				
DIVER	Eel Grass	Fucus	Hair Kelp	Large Brown Kelp	Other[b]
Davidson (BD)	0.99	1.38	1.42	1.09	1.20
Gordon (DG)	0.74	2.07	2.04	1.58	1.14
Larson	1.03	1.10	1.39	1.12	1.10
Lynch (BL)	1.03	1.10	1.39	1.12	1.10

[a] Overall ratio weighted by the annual sample size.
[b] includes all other substrate types

Table 2b. Southeast mean annual[a] herring spawn deposition diver calibration ratios (lab:visual), 1998 (based on data from 1982-1988, 1993-1998).

	SUBSTRATE				
	Eel Grass	Fucus	Hair Kelp	Large Brown Kelp	Other[b]
Davidson (BD)	1.32	1.43	1.37	1.18	0.93
Gordon (DG)	1.16	1.53	1.35	1.47	1.07
Larson (RL)	1.09	1.08	1.28	1.12	1.09

[a] Overall ratio weighted by the annual sample size.
[b] i.e. all other substrate types.

Table 3. Key to bottom types used for herring spawn deposition survey.

Code	Expanded code	Species included	Latin names
AGM	Agarum	Sieve kelp	*Agarum clathratum*
ALA	Alaria	Ribbon kelps	*Alaria marginata, A. nana, A. fistulosa*
ELG	Eel grass	Eel grass, surfgrasses	*Zostera marina, Phyllospadix serrulatus, P. scouleri*
FIL	Filamentous algae	Sea hair	*Enteromorpha intestinalis*
FIR	Fir kelp	Black pine, Oregon pine (red algae)	*Neorhodomela larix, N.oregona*
FUC	Fucus	Rockweed	*Fucus gardneri*
HIR	Hair kelp	Witch's hair, stringy acid kelp	*Desmarestia aculeata, D. viridis*
LAM	Laminaria	split kelp, sugar kelp, suction-cup kelp	*Laminaria bongardiana, L. saccharina, L. yezoensis (when isolated and identifiable)*
LBK	Large Brown Kelps	Five-ribbed kelp, three-ribbed kelp, split kelp, sugar kelp, sea spatula, sieve kelp, ribbon kelp	*Costaria costata, Cymathere triplicata, Laminaria spp., Pleurophycus gardneri, Agarum, Alaria spp.*
MAC	Macrocystis	Small perennial kelp	*Macrocystis integrifolia*
NER	Nereocystis	Bull kelp	*Nereocystis leutkeana*
RED	Red algae	All red leafy algae (red ribbons, red blades, red sea cabbage, Turkish washcloth)	*Palmaria mollis, P. hecatensis, P. callophylloides, Dilsea californica, Neodilsea borealis, Mastocarpus papillatus, Turnerella mertensiana*
ULV	Ulva	Sea lettuce	*Ulva fenestrata, Ulvaria obscura*
COR	Coralline algae	Coral seaweeds (red algae)	*Bossiella, Corallina, Serraticardia*

Table 4a. Summary of Sitka Sound herring spawn deposition survey, 1997.

	Inside Harbor	Outside Harbor	Description
Total sum of quadrant estimates	193	393	number of estimates made, summed over all transects
Total number of eggs/.1meter quadrant (1,000s)	2,665	15,124	total number of eggs (1,000s) counted by divers
Total number of transects	5	20	
Average length of transects in meters	185	94	(total samples*5 meters/total transects)
Lineal meters of shoreline receiving spawn	1,852	58,894	(1 nm and 31.8 nm of shore* 1852 meters/nmile)
Total area surveyed (meter^2)	343,139	5,554,844	(length of shoreline * average width of transects)
Average quadrant density	14	38	(total eggs[1,000s] / total number of observations)
Average egg density per meter^2	138,098	384,826	(average .1 meter quadrant sample*1,000 eggs*10 meters)
Total number of eggs in survey area	47,386,723,968	2,137,649,691,629	(total survey area in meters * total eggs per meter)
Unadjusted escapement estimate in tons	470	21,180	(total number of eggs / 100,928,570 eggs per ton of spawners[a])
Corrected escapement using 10% egg loss	522	23,533	(adjustment to account for 10% egg loss prior to survey)
Additional biomass from post-survey deposition		3,071	From spawning after survey (8.3 nmiles*(740 tons/nmile)/2)
Total biomass in tons of spawning herring for Sitka area in 1997.	522	26,604	Total of 27,126 tons for Sitka Sound (inside and outside harbor)

[a] Eggs to spawning biomass conversion 100,928,570 eggs/ton based on 1996 Sitka Sound fecundity sampling.

Table 4b. Summary of Sitka Sound herring spawn deposition survey, 1998.

	Inside Harbor	Outside Harbor	Description
Total sum of quadrant estimates	165	569	number of estimates made, summed over all transects
Total number of eggs/.1meter quadrant (1,000s)	4,578	19,381	total number of eggs (1,000s) counted by divers
Total number of transects	5	35	
Average length of transects in meters	165	81	(total samples*5 meters/total transects)
Lineal meters of shoreline receiving spawn	1,852	113,435	(1 nm and 61.25 nm of shore * 1852 meters/nmile)
Total area surveyed (meter^2)	305,580	9,220,645	(length of shoreline * average width of transects)
Average quadrant density	28	34	(total eggs[1,000s] / total number of observations)
Average egg density per meter^2	277,464	340,622	(average .1 meter quadrant sample*1,000 eggs*10 meters)
Total number of eggs in survey area	84,787,338,000	3,140,755,870,000	(total survey area in meters * total eggs per meter)
Uncorrected biomass estimate in tons	848	31,408	(total number of eggs / 102,567,376 eggs per ton of spawners)[a]
Corrected biomass estimate (10% mortality)	942	34,897	(adjustment to account for 10% egg loss prior to survey)

[a] Eggs to spawning biomass conversion 102,567,376 eggs/ton based on 1998 Sitka Sound fecundity sampling.

Table 5a. Sitka Sound (inside harbor) spawn deposition survey raw data, 1997.

Dates: April 8 & 9, 1997.
Divers: Robert Larson (RL)

TRANSECT #	INCREMENT (Meters)	DEPTH (Feet)	BOTTOM TYPE	VEGETATION TYPE	RL EYE	RL CORRECTION
P1	5	0	rck	fuc	65	71.5
		6	rck	lbk	15	16.8
		12	rck	lbk	5	5.6
		15	rck	lbk	1	1.1
		16	grv	lbk	0	0.0
		17	grv	lbk	0	0.0
		19	grv	lbk	0	0.0
		22	grv	lbk	0	0.0
		24	grv	lbk	0	0.0
		25	grv	lbk	0	0.0
		28	grv	lbk	0	0.0
		29	snd	lbk	0	0.0
		30	snd	lbk	0	0.0
		31	snd	n/a	0	0.0
		31	snd	n/a	0	0.0
		31	snd	lbk	0	0.0
		32	snd	n/a	0	0.0
		33	snd	n/a	0	0.0
		33	snd	n/a	0	0.0
P2	5	2	grv	n/a	0	0.0
		4	grv	n/a	0	0.0
		5	grv	n/a	0	0.0
		7	gr/cob	fuc	0	0.0
		8	gr/cob	fuc	0	0.0
		9	gr/cob	fuc	0	0.0
		11	gr/cob	ulva	0	0.0
		12	cob	lbk	20	22.4
		13	cob/silt	lbk	25	28.0
		12	cob/silt	lbk	70	78.4
		14	cob/silt	lbk/eg	100	110.0
		14	cob/silt	lbk/eg		0.0
		14	cob/silt	lbk/eg	5	5.5
		15	cob/silt	lbk	70	78.4
		17	cob/silt	lbk	40	44.8
		19	snd	lbk	80	89.6
		22	snd	lbk	20	22.4
		22	slt	lbk	25	28.0
		25	cob/silt	lbk	50	56.0
		26	cob/silt	lbk	60	67.2
		28	cob/silt	lbk	40	44.8
		28	silt	lbk	40	44.8
		30	silt	lbk	50	56.0
		32	silt	n/a	100	110.0
		32	mud	n/a	15	16.5
		33	mud	n/a	0	0.0
		34	mud	lbk	0	0.0
		34	mud	n/a	10	11.0
		34	mud	n/a	0	0.0
P3	5	0	bld	n/a	0	0.0
		3	bld	fuc	30	33.0
		4	bld	fuc	2	2.2
		5	cob	fil	0	0.0
		5	cob	fir	110	121.0
		7	cob	fir	275	302.5
		7	bld	lbk	35	39.2
		7	bld	lbk	150	168.0
		8	cob/snd	lbk	75	84.0
		8	bld		0	0.0
		10	bld	fil	3	3.3
		11	bld	lbk	0	0.0
		11	cob	lbk	0	0.0
		12	bld	n/a	0	0.0
		15	bld	n/a	0	0.0
		15	cob	lbk	15	16.8
		16	cob	lbk	0	0.0
		17	cob	lbk	0	0.0
		18	cob	lbk	20	22.4
		18	cob	lbk	50	56.0
		20	cob	lbk	25	28.0
		20	bld/cob	lbk	70	78.4
		20	bld/cob	lbk	40	44.8
		22	bld/cob	lbk	20	22.4
		22	bld/cob	lbk	15	16.8
		22	cob/slt	lbk	10	11.2
		22	cob/slt	n/a	0	0.0
		22	cob/slt	lbk	8	9.0
		22	cob/slt	lbk	5	5.6
		22	cob/slt	lbk	0	0.0
		22	cob/slt	lbk	10	11.2
		22	cob/slt	n/a	0	0.0
		22	cob/slt	lbk	0	0.0
		22	cob/slt	lbk	0	0.0
		24	cob/slt	lbk	0	0.0
		24	cob/slt	lbk	0	0.0
		24	cob/slt	lbk	0	0.0
		25	cob	lbk	25	28.0
		26	cob	lbk	25	28.0
		26	bld	lbk	40	44.8
		28	bld	lbk	10	11.2
		28	cob	lbk	5	5.6
		29	cob/slt	lbk	1	1.1
		30	cob/slt	lbk	0	0.0
		31	cob/slt	lbk	0	0.0
		32	cob/slt	lbk	0	0.0
P4	5	2	rck	fuc	0	0.0
		5	rck	fuc	0	0.0
		6	gvl	n/a	0	0.0
		6	gvl	fuc	0	0.0
		6	mud	fuc	0	0.0
		6	gvl	n/a	0	0.0
		6	gvl	fil	0	0.0
		6	cbl	fil	0	0.0
		6	cbl	fil	0	0.0
		7	cbl	fir	0	0.0
		7	snd	red	0	0.0
		7	cbl	fir	0	0.0
		8	snd	lbk	1	1.1
		8	cbl	elg	25	25.8
		9	snd	lbk	2	2.2
		9	snd	n/a	0	0.0
		9	snd	gvl	0	0.0
		10	slt	n/a	0	0.0
		10	slt	n/a	0	0.0
		10	slt	gvl	0	0.0
		10	slt	gvl	1	1.1
		11	slt	fir	4	4.4
		11	slt	egl	5	5.5
		11	slt	fir	200	220.0
		11	slt	fir	0	0.0
		12	slt	n/a	0	0.0
		12	slt	fir	0	0.0
		12	slt	fir	0	0.0
		12	slt	elg	0	0.0
		12	mud	elg	0	0.0
		13	mud	n/a	0	0.0
		14	mud	n/a	0	0.0
		14	mud	n/a	0	0.0
		15	mud	elg	0	0.0
		15	mud	n/a	0	0.0
		16	mud	n/a	0	0.0
		16	mud	n/a	0	0.0
		17	mud	n/a	0	0.0
		17	mud	n/a	0	0.0
		18	mud	lbk	0	0.0
		19	mud	n/a	0	0.0
		20	mud	n/a	0	0.0
		21	mud	n/a	0	0.0
		21	mud	lbk	0	0.0
		22	mud	n/a	0	0.0
		23	mud	n/a	0	0.0
		24	mud	n/a	0	0.0
		24	mud	n/a	0	0.0
		25	mud	n/a	0	0.0
		25	mud	n/a	0	0.0
		26	mud	n/a	0	0.0
		26	mud	n/a	0	0.0
		26	mud	n/a	0	0.0
		27	mud	n/a	0	0.0
		28	bld	lbk	0	0.0
		28	mud	n/a	0	0.0
P5	5	0	rck	n/a	0	0.0
		4	rck	fuc	0	0.0
		5	rck	fuc	0	0.0
		7	rck	fuc	0	0.0
		8	rck	fuc	0	0.0
		7	mud	n/a	0	0.0
		8	gr/slt	elg	0	0.0
		9	gr/slt	fir	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	1	1.1
		10	slt	elg	0	0.0
		9	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	0	0.0
		10	slt	elg	1	1.1
		11	slt	elg	15	16.5
		10	slt	elg	0	0.0
		11	slt	elg	55	56.7
		11	slt	elg	45	46.4
		10	slt	elg	1	1.0
		10	slt	elg	60	61.8
		11	slt	elg	15	15.5
		12	slt	elg	1	1.0
		13	slt	elg	2	2.1
		13	slt	elg	0	0.0
		13	slt	elg	0	0.0
		14	slt	elg	0	0.0
		14	slt	elg	0	0.0
		17	slt	elg	0	0.0
		19	slt	elg	0	0.0
		20	slt	elg	0	0.0
		20	slt	n/a	0	0.0
		21	slt	n/a	0	0.0
		22	slt	lbk	0	0.0
		22	slt	lbk	0	0.0
		22	slt	lbk	0	0.0
		22	slt	lbk	0	0.0
		22	slt	n/a	0	0.0
		23	slt	n/a	0	0.0

Table 5b. Sitka Sound (inside harbor) spawn deposition survey raw data, 1998.

Date: April 1, 1998
Divers: Dave Gordon = DG, Bill Davidson = BD

Transect	depth	Bottom Type	Vegetative Type	BD eye	DG eye	BD Corrected	DG Corrected
P1	-10	rck	fuc	35		50	
	0	rck	fir	55		51	
	4	rck		0		0	
	5	rck		0		0	
	8	snd	elg	0		0	
	11	snd		0		0	
	13	slt		0		0	
	15	snd	lbk	2		2	
	17	snd	lbk	20		24	
	19	cbl	lbk	1		1	
	20	cbl	lbk	1		1	
	19	cbl	fir	0		0	
	22	snd		0		0	
	23	snd	lbk	0		0	
	24	snd	lbk	0		0	
	25	mud		0		0	
	25	mud	lbk	0		0	
P2	-6	rck	fuc	20		29	
	-5	cbl	fuc	40		57	
	-3	gvl	fuc	25		36	
	-1	gvl	fuc	2		3	
	1	snd	fuc	12		17	
	2	cbl	fuc	250		357	
	2	cbl	fir	160		148	
	2	cbl	fuc	25		36	
	2	cbl	fuc	4		6	
	3	cbl	fuc	15		21	
	4	cbl	fuc	1		1	
	4	gvl		0		0	
	6	cbl	lbk	0		0	
	7	cbl	lbk	0		0	
	10	cbl	lbk	0		0	
	12	cbl		0		0	
	14	cbl	lbk	0		0	
	17	mud		0		0	
	19	mud	lbk	0		0	
	20	mud	lbk	0		0	
P3	-4	bld		12		11	
	-2	bld	fir	45		42	
	-1	cbl	ulv	3		3	
	0	cbl	ulv	8		7	
	1	cbl	fir	35		32	
	1	cbl	fir	70		65	
	2	bld	fir	120		111	
	2	bld	fir	110		102	
	3	bld	fir	60		56	
	4	bld	lbk	25		29	
	5	bld	lbk	20		24	
	7	cbl	lbk	35		41	
	8	cbl	fil	15		14	
	9	cbl	lbk	45		53	
	10	cbl	lbk	25		29	
	11	cbl	lbk	2		2	
	13	cbl		12		11	
	13	cbl	fil	6		6	
	15	cbl	lbk	15		18	
	14	cbl	lbk	25		29	

Transect	depth	Bottom Type	Vegetative Type	BD eye	DG eye	BD Corrected	DG Corrected
P3	15	cbl	lbk	4		5	
	15	cbl	lbk	15		18	
	15	cbl	lbk	18		21	
	15	bld	lbk	40		47	
	16	cbl	lbk	20		24	
	15	bld		30		28	
	15	bld	lbk	1		1	
	15	cbl	fil	60		56	
	15	cbl	lbk	5		6	
	15	cbl	fil	8		7	
	15	cbl	lbk	2		2	
	15	cbl	lbk	50		59	
	16	cbl	lbk	90		106	
	16	cbl	lbk	70		82	
	16	cbl	fil	90		83	
	18	cbl	lbk	0		0	
	18	cbl	lbk	35		41	
	19	cbl	fil	0		0	
	19	cbl	fil	1		1	
	20	cbl	fil	0		0	
	21	cbl	fil	0		0	
P4	-6	bld			0		0
	-5	bld	fuc		50		76
	-4	bld			0		0
	-3	cbl			0		0
	-2	cbl			0		0
	-1	cbl			0		0
	-1	bld	fuc		1		2
	0	bld	fuc		110		168
	0	bld	fuc		120		183
	0	bld	fuc		160		244
	0	bld	fuc		75		115
	0	sn	fir		75		80
	1	sn	lbk		0		0
	2	sn	fir		1		1
	2	sn	elg		45		52
	3	sn	elg		110		127
	3	sn	fir		3		3
	4	sn	fir		4		4
	4	mu			0		0
	4	mu	elg		1		1
	4	mu	elg		6		7
	5	mu	lbk		25		38
	5	mu	elg		50		58
	6	mu	elg		10		12
	6	mu	elg		40		46
	7	mu	elg		30		35
	7	mu	hir		240		257
	8	mu	hir		1		1
	8	mu	hir		150		161
	9	mu			0		0
	9	mu	lbk		1		1
	10	mu			0		0
	11	mu			0		0
	13	mu			0		0
	14	mu	lbk		3		4
	15	mu	hir		0		0

Transect	depth	Bottom Type	Vegetative Type	BD eye	DG eye	BD Corrected	DG Corrected
P4	16	mud	hir		8		9
	17	mud			0		0
	18	mud			0		0
	20	mud			0		0
	21	mud			0		0
	22	mud			0		0
	23	mud			0		0
	24	mud	hir		0		0
	25	mud	lbk		5		7
	26	mud			0		0
	27	mud	lbk		0		0
	28	mud			0		0
	29	mud	lbk		0		0
P5	-8	bld			0		0
	-6	bld			9		10
	-6	bld			0		0
	-5	gvl	fuc		10		15
	-5	bld			16		17
	-5	cbl	fuc		5		8
	-4	bld	fuc		4		6
	-4	bld			3		3
	-3	bld			0		0
	-2	mud			0		0
	-2	mud			0		0
	-1	mud	elg		60		69
	-1	gvl			0		0
	-1	mud	hir		1		1
	-1	mud	fir		8		9
	0	cbl	elg		2		2
	0	mud	elg		3		3
	1	mud	elg		50		58
	1	mud	elg		45		52
	1	mud	elg		60		69
	1	mud	elg		30		35
	1	mud	elg		20		23
	1	mud	elg		25		29
	2	mud	elg		100		116
	2	mud	elg		80		93
	2	mud	elg		45		52
	2	mud	elg		35		41
	3	mud			0		0
	3	mud			0		0
	3	mud	lbk		0		0
	4	mud	elg		0		0
	5	mud	elg		5		6
	8	mud	elg		2		2
	9	mud	elg		0		0
	10	mud			0		0
	11	mud			0		0
	12	mud			0		0
	12	mud			0		0
	13	mud			0		0

Table 6a. Sitka Sound (outside harbor) spawn deposition survey raw data, 1997.

Dates: April 7-9, 1997
Divers: Robert Larson (RL), Bill Davidson (BD), Brian Lynch (BL), Ed Grossman (EG).

TRANSECT #	INCREMENT (Meters)	DEPTH (Feet)	BOTTOM TYPE	VEGETATION TYPE	BL EYE	DG EYE	RL EYE	BD EYE	BL CORRECTION	DG CORRECTION	RL CORRECTION	BD CORRECTION
1	5	6	bld	fuc		0			0	0	0	0
		5	bld	fuc		0			0	0	0	0
		4	bld	n/a		0			0	0	0	0
		3	cbl	n/a		0			0	0	0	0
		2	cbl	fir		150			0	171	0	0
		0	cbl	lbk		20			0	31.6	0	0
		5	gvl	lbk		40			0	63.2	0	0
		6	snd	lbk		50			0	79	0	0
		8	snd	lbk		35			0	55.3	0	0
		10	slt	lbk		20			0	31.6	0	0
		13	slt	lbk		25			0	39.5	0	0
		16	slt	n/a		0			0	0	0	0
		17	slt	lbk		20			0	31.6	0	0
		20	mud	lbk		0			0	0	0	0
		21	mud	lbk		0			0	0	0	0
		23	mud	lbk		10			0	15.8	0	0
		24	mud	lbk		7			0	11.1	0	0
		26	mud	lbk		0			0	0	0	0
		28	mud	lbk		5			0	7.9	0	0
		30	mud	lbk		5			0	7.9	0	0
		32	mud	lbk		1			0	1.58	0	0
		33	mud	n/a		0			0	0	0	0
2	5	7	bld	n/a	0				0	0	0	0
		4	cbl	fuc	60				72	0	0	0
		2	cbl	fir	1				1.23	0	0	0
		0	rck	fir	250				308	0	0	0
		5	gvl	lbk	1				1.33	0	0	0
		8	rck	lbk	5				6.65	0	0	0
		9	rck	lbk	0				0	0	0	0
		13	slt	lbk	0				0	0	0	0
		15	slt	lbk	0				0	0	0	0
		17	slt	lbk	0				0	0	0	0
		21	slt	n/a	0				0	0	0	0
		23	slt	n/a	0				0	0	0	0
		27	slt	n/a	0				0	0	0	0
3	5	0	rck	fir			50		0	0	55	0
		6	rck	fir			0		0	0	0	0
		15	rck	fir			0		0	0	0	0
		21	rck	n/a			0		0	0	0	0
		27	rck	n/a			0		0	0	0	0
		33	snd	lbk			0		0	0	0	0
4	5	-4	rck	fuc			100		0	0	110	0
		1	rck	lbk			200		0	0	224	0
		6	rck	lbk			15		0	0	16.8	0
		9	rck	lbk			10		0	0	11.2	0
		13	rck	lbk			5		0	0	5.6	0
		16	cbl	lbk			5		0	0	5.6	0
		19	cbl	lbk			1		0	0	1.12	0
		21	slt	lbk			20		0	0	22.4	0
		21	slt	lbk			40		0	0	44.8	0
		23	slt	lbk			1		0	0	1.12	0
		23	mud	lbk			0		0	0	0	0
5	5	2	bld	fuc				0	0	0	0	0
		7	bld	lbk				0	0	0	0	0
		15	bld	lbk				20	0	0	0	21.8
		19	gvl	lbk				10	0	0	0	10.9
		20	bld	lbk				80	0	0	0	87.2
		22	bld	lbk				40	0	0	0	43.6
		23	bld	lbk				35	0	0	0	38.1
		24	gvl	lbk				35	0	0	0	38.1
		25	gvl	lbk				35	0	0	0	38.1
		26	gvl	lbk				45	0	0	0	49.0
		27	gvl	lbk				30	0	0	0	32.7
		28	gvl	lbk				40	0	0	0	43.6
		29	gvl	lbk				30	0	0	0	32.7
		30	gvl	lbk				15	0	0	0	16.3
		30	gvl	lbk				15	0	0	0	16.3
		31	gvl	lbk				5	0	0	0	5.45
		31	gvl	lbk				18	0	0	0	19.6
		32	rck	lbk				25	0	0	0	27.2
		33	bld	lbk				50	0	0	0	54.5
		33	rck	lbk				60	0	0	0	65.4
		35	rck	lbk				65	0	0	0	70.8
		36	rck	lbk				50	0	0	0	54.5
		38	gvl	lbk				7	0	0	0	7.63
		40	rck	lbk				4	0	0	0	4.36
		43	slt	n/a				0	0	0	0	0
		43	slt	n/a				0	0	0	0	0
6	5	3	bld	n/a		0			0	0	0	0
		1	bld	fuc		10			0	20.7	0	0
		1	rck	fuc		35			0	72.5	0	0
		3	rck	n/a		25			0	28.5	0	0
		4	rck	n/a		10			0	11.4	0	0
		5	snd	elg		120			0	88.8	0	0
		6	snd	elg		80			0	59.2	0	0
		6	snd	elg		200			0	148	0	0
		7	snd	elg		250			0	185	0	0
		7	snd	elg		200			0	148	0	0
		8	snd	elg		2			0	1.48	0	0
		8	snd	elg		120			0	88.8	0	0
		8	snd	elg		200			0	148	0	0
		8	snd	elg		200			0	148	0	0
		8	snd	elg		200			0	148	0	0
		8	snd	fir		5			0	5.7	0	0
		8	snd	fir		15			0	17.1	0	0
		8	snd	fir		0			0	0	0	0
		9	gvl	fir		1			0	1.14	0	0
		9	gvl	lbk		0			0	0	0	0
		10	gvl	lbk		0			0	0	0	0
		11	gvl	fir		4			0	4.56	0	0
		12	gvl	fir		0			0	0	0	0
		14	gvl	fir		0			0	0	0	0
		15	gvl	fir		2			0	2.28	0	0
		18	slt	fir		0			0	0	0	0
		21	slt	fir		0			0	0	0	0
		23	slt	lbk		8			0	12.6	0	0
		32	slt	fir		1			0	1.14	0	0
		39	slt	fir		0			0	0	0	0
		39	slt	lbk		1			0	1.58	0	0
		41	slt	fir		20			0	22.8	0	0
		43	slt	n/a		0			0	0	0	0
7	5	5	bld	n/a	0				0	0	0	0
		4	bld	n/a	0				0	0	0	0
		2	bld	n/a	0				0	0	0	0
		1	snd	n/a	0				0	0	0	0
		0	snd	n/a	1				1.2	0	0	0

Table 6a. (page 2 of 4).

TRANSECT #	INCREMENT (Meters)	DEPTH (Feet)	BOTTOM TYPE	VEGETATION TYPE	BL EYE	DG EYE	RL EYE	BD EYE	BL CORRECTION	DG CORRECTION	RL CORRECTION	BD CORRECTION
		1	snd	elg	200				168	0	0	0
		3	snd	elg	200				168	0	0	0
		4	snd	elg	120				101	0	0	0
		5	snd	elg	200				168	0	0	0
		6	snd	elg	200				168	0	0	0
		7	snd	fir	30				36.9	0	0	0
		7	snd	elg	1				0.84	0	0	0
		8	bld	fir	0				0	0	0	0
		9	snd	lbk	0				0	0	0	0
		10	snd	lbk	0				0	0	0	0
		11	snd	lbk	0				0	0	0	0
		12	snd	n/a	0				0	0	0	0
		13	slt	n/a	0				0	0	0	0
		13	slt	lbk	0				0	0	0	0
		14	slt	n/a	0				0	0	0	0
		15	slt	lbk	0				0	0	0	0
		16	slt	lbk	0				0	0	0	0
		17	slt	lbk	0				0	0	0	0
		19	slt	lbk	0				0	0	0	0
		20	slt	lbk	0				0	0	0	0
		21	slt	lbk	0				0	0	0	0
		22	slt	lbk	0				0	0	0	0
		23	slt	elg	7				5.88	0	0	0
		25	slt	n/a	0				0	0	0	0
		26	slt	n/a	0				0	0	0	0
		28	slt	n/a	0				0	0	0	0
		30	slt	n/a	0				0	0	0	0
		32	slt	fir	10				12.3	0	0	0
		33	slt	fir	15				18.5	0	0	0
		35	slt	n/a	0				0	0	0	0
		37	rck	n/a	0				0	0	0	0
		41	slt	n/a	0				0	0	0	0
		44	slt	n/a	0				0	0	0	0
8	5	1	gvl	n/a			0		0	0	0	0
		5	gvl	n/a			0		0	0	0	0
		6	snd	elg			0		0	0	0	0
		7	snd	elg			4		0	0	4.12	0
		8	snd	fir			10		0	0	11	0
		6	gvl	elg			125		0	0	129	0
		7	snd	elg			65		0	0	67	0
		8	snd	elg			75		0	0	77.3	0
		12	snd	n/a			0		0	0	0	0
		17	snd	n/a			0		0	0	0	0
		20	snd	n/a			0		0	0	0	0
		23	snd	lbk			0		0	0	0	0
		27	snd	lbk			0		0	0	0	0
		30	snd	n/a			0		0	0	0	0
9	5	1	rck	fuc		0			0	0	0	0
		3	cbl	n/a		0			0	0	0	0
		4	bld	fuc		35			0	72.5	0	0
		9	bld	lbk		0			0	0	0	0
		11	bld	lbk		0			0	0	0	0
		15	bld	lbk		0			0	0	0	0
		17	slt	lbk		0			0	0	0	0
		21	slt	lbk		0			0	0	0	0
		23	slt	lbk		0			0	0	0	0
		34	slt	lbk		0			0	0	0	0
10	5	0	rck	n/a		0			0	0	0	0
		7	rck	fir		1			0	1.14	0	0
		16	snd	lbk		100			0	158	0	0
		18	snd	lbk		2			0	3.16	0	0
		19	snd	lbk		50			0	79	0	0
		19	snd	lbk		30			0	47.4	0	0
		19	snd	lbk		110			0	174	0	0
		19	bld	lbk		8			0	12.6	0	0
		20	bld	lbk		1			0	1.58	0	0
		21	bld	n/a		0			0	0	0	0
		23	snd	lbk		30			0	47.4	0	0
		24	snd	lbk		90			0	142	0	0
		24	snd	lbk		25			0	39.5	0	0
		25	snd	lbk		65			0	103	0	0
		26	snd	lbk		40			0	63.2	0	0
		27	snd	lbk		0			0	0	0	0
		27	snd	lbk		3			0	4.74	0	0
		28	snd	n/a		0			0	0	0	0
		29	snd	lbk		5			0	7.9	0	0
		30	snd	lbk		4			0	6.32	0	0
		31	snd	lbk		1			0	1.58	0	0
		32	snd	lbk		0			0	0	0	0
		33	snd	lbk		5			0	7.9	0	0
		34	snd	lbk		0			0	0	0	0
		35	snd	n/a		0			0	0	0	0
		35	snd	lbk		1			0	1.58	0	0
		36	snd	lbk		8			0	12.6	0	0
		36	snd	lbk		30			0	47.4	0	0
		36	snd	lbk		5			0	7.9	0	0
		36	snd	n/a		0			0	0	0	0
		37	snd	n/a		0			0	0	0	0
		37	snd	n/a		0			0	0	0	0
		37	snd	lbk		1			0	1.58	0	0
		38	snd	n/a		0			0	0	0	0
		38	snd	lbk		0			0	0	0	0
		38	snd	n/a		0			0	0	0	0
		38	snd	n/a		0			0	0	0	0
11	5	2	rck	fuc			0		0	0	0	0
		11	rck	fir			140		0	0	154	0
		15	rck	fir			20		0	0	22	0
		21	cbl	lbk			2		0	0	2.24	0
		18	rck	lbk			100		0	0	112	0
		26	rck	lbk			1		0	0	1.12	0
		28	snd	lbk			15		0	0	16.8	0
		29	snd	lbk			2		0	0	2.24	0
		30	snd	lbk			55		0	0	61.6	0
		31	snd	lbk			25		0	0	28	0
		33	snd	lbk			20		0	0	22.4	0
		34	snd	lbk			30		0	0	33.6	0
		35	snd	lbk			50		0	0	56	0
		35	snd	lbk			80		0	0	89.6	0
		35	snd	lbk			60		0	0	67.2	0
		35	snd	lbk			20		0	0	22.4	0
		35	snd	lbk			2		0	0	2.24	0
		35	snd	lbk			1		0	0	1.12	0
		32	rck	lbk			30		0	0	33.6	0
		29	snd	lbk			40		0	0	44.8	0
		33	snd	lbk			120		0	0	134	0
		35	snd	lbk			15		0	0	16.8	0
		35	snd	n/a			0		0	0	0	0
		35	snd	n/a			0		0	0	0	0

Table 6a. (page 3 of 4).

TRANSECT #	INCREMENT (Meters)	DEPTH (Feet)	BOTTOM TYPE	VEGETATION TYPE	BL EYE	DG EYE	RL EYE	BD EYE	BL CORRECTION	DG CORRECTION	RL CORRECTION	BD CORRECTION
12	5	1	rck	fir			0		0	0	0	0
		11	rck	fir			150		0	0	165	0
		21	rck	lbk			175		0	0	196	0
		27	rck	lbk			50		0	0	56	0
		36	rck	lbk			40		0	0	44.8	0
		41	snd	lbk			3		0	0	3.36	0
		49	snd	n/a			0		0	0	0	0
13	5	0	rck	n/a				0	0	0	0	0
		13	rck	n/a				150	0	0	0	180
		15	snd	lbk				30	0	0	0	32.7
		18	snd	lbk				0	0	0	0	0
		17	rck	lbk				210	0	0	0	229
		20	snd	lbk				1	0	0	0	1.09
		20	snd	fuc				1	0	0	0	1.38
		21	snd	lbk				40	0	0	0	43.6
		23	snd	lbk				15	0	0	0	16.4
		23	rck	lbk				125	0	0	0	136
		23	rck	lbk				100	0	0	0	109
		23	rck	lbk				150	0	0	0	164
		22	rck	n/a				70	0	0	0	84
		23	rck	lbk				400	0	0	0	436
		24	rck	lbk				250	0	0	0	273
		21	rck	lbk				250	0	0	0	273
		23	rck	lbk				230	0	0	0	251
		24	rck	lbk				200	0	0	0	218
		22	rck	lbk				150	0	0	0	164
		20	rck	lbk				140	0	0	0	153
		20	rck	lbk				200	0	0	0	218
		31	rck	lbk				400	0	0	0	436
		37	snd	lbk				60	0	0	0	65.4
		39	snd	lbk				65	0	0	0	70.9
		42	snd	lbk				40	0	0	0	43.6
		44	snd	lbk				20	0	0	0	21.8
		44	snd	lbk				1	0	0	0	1.09
		45	snd	lbk				5	0	0	0	5.45
		46	snd	n/a				0	0	0	0	0
		47	snd	n/a				0	0	0	0	0
14	5	-1	rck	fuc			120		0	0	132	0
		2	rck	fir			90		0	0	99	0
		4	rck	fir			125		0	0	137.	0
		6	rck	fir			280		0	0	308	0
		8	rck	fir			10		0	0	11	0
		7	rck	fir			25		0	0	27.5	0
		8	snd	fir			1		0	0	1.1	0
		9	rck	fir			70		0	0	77	0
		9	rck	fir			0		0	0	0	0
		11	rck	fir			0		0	0	0	0
		13	rck	fir			0		0	0	0	0
		19	gvl	fir			25		0	0	27.5	0
		20	gvl	fir			20		0	0	22	0
		22	gvl	fir			30		0	0	33	0
		24	gvl	fir			245		0	0	269.	0
		25	snd	fir			50		0	0	55	0
		27	snd	fir			150		0	0	165	0
		30	cbl	fir			40		0	0	44	0
		32	snd	fir			350		0	0	385	0
		35	snd	fir			25		0	0	27.5	0
		36	rck	n/a			100		0	0	110	0
		40	rck	lbk			175		0	0	196	0
		43	rck	n/a			40		0	0	44	0
		46	snd	n/a			0		0	0	0	0
		49	snd	n/a			20		0	0	22	0
		52	snd	n/a			1		0	0	1.1	0
15	5	0	rck	fuc			0		0	0	0	0
		6	slt	fil			0		0	0	0	0
		11	slt	lbk			70		0	0	78.4	0
		17	rck	lbk			80		0	0	89.6	0
		20	slt	n/a			3		0	0	3.3	0
		22	gvl	lbk			10		0	0	11.2	0
		24	gvl	lbk			18		0	0	20.1	0
		25	gvl	lbk			10		0	0	11.2	0
		27	gvl	lbk			80		0	0	89.6	0
		27	gvl	lbk			110		0	0	123.	0
		28	gvl	lbk			10		0	0	11.2	0
		29	gvl	lbk			35		0	0	39.2	0
		30	gvl	lbk			120		0	0	134.	0
		30	gvl	lbk			45		0	0	50.4	0
		31	gvl	lbk			35		0	0	39.2	0
		31	gvl	lbk			30		0	0	33.6	0
		31	gvl	n/a			0		0	0	0	0
		30	rck	lbk			90		0	0	100.	0
		30	rck	lbk			130		0	0	145.	0
		27	rck	lbk			65		0	0	72.8	0
		25	rck	lbk			100		0	0	112	0
16	5	13	bld	n/a	0				0	0	0	0
		19	bld	lbk	0				0	0	0	0
		24	bld	n/a	0				0	0	0	0
		35	bld	lbk	0				0	0	0	0
		43	bld	lbk	60				79.8	0	0	0
		51	bld	lbk	50				66.5	0	0	0
		65	snd	n/a	0				0	0	0	0
17	5	1	rck	n/a		0			0	0	0	0
		10	rck	fil		0			0	0	0	0
		21	rck	fil		0			0	0	0	0
		30	cbl	lbk		1			0	1.58	0	0
		39	cbl	n/a		1			0	1.14	0	0
		47	cbl	lbk		25			0	39.5	0	0
		57	cbl	lbk		4			0	6.32	0	0
18	5	13	bld	fuc	0				0	0	0	0
		11	bld	fuc	0				0	0	0	0
		22	bld	fuc	50				60	0	0	0
		25	grv	n/a	0				0	0	0	0
		28	grv	n/a	0				0	0	0	0
		29	grv	n/a	0				0	0	0	0
		30	grv	n/a	1				1.23	0	0	0
		31	grv	n/a	0				0	0	0	0
		31	grv	lbk	0				0	0	0	0
		31	grv	lbk	1				1.33	0	0	0
		32	bld	lbk	5				6.65	0	0	0
		33	bld	n/a	0				0	0	0	0
		34	bld	lbk	1				1.33	0	0	0
		32	bld	lbk	0				0	0	0	0
		31	bld	lbk	0				0	0	0	0
		24	bld	lbk	40				53.2	0	0	0
		22	bld	lbk	80				106	0	0	0
		18	bld	lbk	0				0	0	0	0

Table 6a. (page 4 of 4).

TRANSECT #	INCREMENT (Meters)	DEPTH (Feet)	BOTTOM TYPE	VEGETATION TYPE	BL EYE	DG EYE	RL EYE	BD EYE	BL CORRECTION	DG CORRECTION	RL CORRECTION	BD CORRECTION
		18	bld	lbk	0				0	0	0	0
		20	bld	lbk	1				1.33	0	0	0
		26	bld	lbk	1				1.33	0	0	0
		31	bld	lbk	5				6.65	0	0	0
		36	grv	n/a	0				0	0	0	0
		37	grv	n/a	0				0	0	0	0
		38	bld	n/a	5				6.15	0	0	0
		34	bld	n/a	10				12.3	0	0	0
		31	bld	n/a	25				30.7	0	0	0
		36	bld	n/a	10				12.3	0	0	0
		39	grv	n/a	0				0	0	0	0
		41	grv	n/a	0				0	0	0	0
		41	grv	n/a	0				0	0	0	0
19	5	0	rck	fuc			0		0	0	0	0
		4	rck	fuc			0		0	0	0	0
		11	rck	fuc			0		0	0	0	0
		13	rck	lbk			20		0	0	22.4	0
		24	rck	lbk			80		0	0	89.6	0
		28	snd	lbk			25		0	0	28	0
		33	snd	lbk			15		0	0	16.8	0
		37	shl	lbk			20		0	0	22.4	0
		40	shl	lbk			20		0	0	22.4	0
		43	shl	n/a			0		0	0	0	0
		45	shl	lbk			8		0	0	8.96	0
		47	shl	lbk			20		0	0	22.4	0
		49	shl	lbk			50		0	0	56	0
		51	gvl	lbk			10		0	0	11.2	0
		52	gvl	lbk			1		0	0	1.12	0
		53	gvl	lbk			55		0	0	61.6	0
		55	gvl	n/a			0		0	0	0	0
20	5	0	rck	n/a			0		0	0	0	0
		6	rck	fuc			0		0	0	0	0
		8	rck	n/a			0		0	0	0	0
		10	cbl	n/a			0		0	0	0	0
		11	rck	fuc			0		0	0	0	0
		16	rck	lbk			0		0	0	0	0
		24	rck	fuc			1		0	0	1.1	0
		28	rck	lbk			20		0	0	22.4	0
		36	rck	lbk			50		0	0	56	0
		41	snd	lbk			25		0	0	28	0
		45	snd	n/a			0		0	0	0	0
		47	snd	lbk			3		0	0	3.36	0
		52	snd	lbk			20		0	0	22.4	0

Table 6b. Sitka Sound (outside harbor) spawn deposition survey raw data, 1998.

Dates: April 1-3, 1998
Divers: Dave Gordon = DG, Bill Davidson = BD, Robert Larson = RL

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
1	2	gv		0			0	0	0
	3	gv		0			0	0	0
	4	sn		2			2	0	0
	4	bl		15			16	0	0
	4	sn		7			7	0	0
	5	sn		0			0	0	0
	5	bl		12			13	0	0
	6	bl	hir	20			27	0	0
	7	bl		0			0	0	0
	8	cbl		1			1	0	0
	8	cbl		3			3	0	0
	9	sn		0			0	0	0
	10	cbl		1			1	0	0
	11	bl		1			1	0	0
	13	gv		0			0	0	0
	14	bl		0			0	0	0
	16	cbl	hir	1			1	0	0
	17	cbl		0			0	0	0
	20	sn		0			0	0	0
	22	sn		0			0	0	0
2	1	rc	co	0			0	0	0
	1	bl	co	0			0	0	0
	3	rc	co	0			0	0	0
	4	rc		0			0	0	0
	7	rc		0			0	0	0
	10	gv		0			0	0	0
	10	gv		0			0	0	0
	15	gv		0			0	0	0
3	1	bl	co	50			54	0	0
	3	rc	co	15			16	0	0
	4	rc		0			0	0	0
	7	rc		0			0	0	0
	10	gv		0			0	0	0
	10	gv		0			0	0	0
	15	gv		0			0	0	0
	-2	rc		3			3	0	0
	-2	bl	fu	40			61	0	0
	-2	rc	fu	65			99	0	0
	1	rc	co	60			64	0	0
4	0	sn	elg		28		0	37	0
	1	sn	elg		30		0	39	0
	2	bl	fir		35		0	33	0
	3	sn	lb		2		0	2	0
	3	sn	elg		20		0	26	0
	3	sn	elg		26		0	34	0
	3	rc	co		3		0	3	0
	6	sn	elg		20		0	26	0
	7	rc	lb		10		0	12	0
	8	rc	ul		7		0	7	0
	9	rc	lb		20		0	24	0
	11	sn	lb		15		0	18	0
	12	sn	lb		9		0	11	0
	13	rc	lb		25		0	30	0
	14	sn	lb		3		0	4	0
	15	sn	lb		2		0	2	0
	16	sn	lb		3		0	4	0
	16	sn			3		0	3	0
	17	sn			6		0	6	0
	18	sn	lb		4		0	5	0
	19	sn	lb		6		0	7	0
	19	sn	lb		10		0	12	0
	20	rc			5		0	5	0
	20	sn	lb		4		0	5	0
	20	sn			3		0	3	0
	17	rc			0		0	0	0
	12	rc	fir		0		0	0	0
	18	rc	fir		0		0	0	0
	23	rc	lb		1		0	1	0
	25	sn	lb		5		0	6	0
	26	bl	co		6		0	6	0
	27	cbl	fir		1		0	1	0
	28	cbl	fir		1		0	1	0
	29	cbl	fir		1		0	1	0
	30	sn	lb		12		0	14	0
	32	sn			0		0	0	0
	33	sn	lb		6		0	7	0
	34	sn	lb		1		0	1	0
	36	sn			0		0	0	0
	39	sn			0		0	0	0
5	10	rc	lb		0		0	0	0
	18	rc	lb		0		0	0	0
	22	rc	lb		0		0	0	0
	23	rc	re		2		0	2	0
	27	rc	re		0		0	0	0
	31	rc	lb		1		0	1	0
	31	rc	lb		0		0	0	0
	25	rc	lb		0		0	0	0
	25	rc			0		0	0	0
	22	rc	lb		0		0	0	0
	26	rc	lb		0		0	0	0
	35	rc			0		0	0	0
6	12	rc	lb		0		0	0	0
	20	rc	lb		0		0	0	0
	23	rc	lb		0		0	0	0
	30	rc	lb		0		0	0	0
	33	rc	lb		0		0	0	0
	35	sn	lb		6		0	7	0
	37	sn	lb		2		0	2	0
	40	sn			0		0	0	0
	41	sn			0		0	0	0
	41	sn	fir		5		0	5	0
	41	sn	fir		5		0	5	0
	42	sn			0		0	0	0
	43	sn			0		0	0	0
	43	sn			0		0	0	0
	44	sn			0		0	0	0
	44	sn			0		0	0	0
7	0	rc	fu			0	0	0	0
	4	gv				0	0	0	0
	6	gv	re			2	0	0	2
	6	gv	elg			80	0	0	87
	8	bl	fir			40	0	0	44
	12	m	lb			2	0	0	2
	12	m				0	0	0	0
	16	m				0	0	0	0
8	1	rc		0			0	0	0
	5	gv	fir	1			1	0	0
	5	cbl		0			0	0	0
	0	rc		0			0	0	0
	5	rc		4			4	0	0
	16	rc		8			9	0	0
	18	gv		0			0	0	0
	17	rc		0			0	0	0
	27	rc		10			11	0	0
	32	sn		0			0	0	0
	34	sn	lb	1			1	0	0
	36	sn		0			0	0	0
	40	sn	lb	1			1	0	0
	43	sn	lb	2			3	0	0
	45	sn		0			0	0	0
	48	sn	lb	6			9	0	0
	54	rc		30			32	0	0
	62	rc		15			16	0	0
9	0	rc	fu		5		0	7	0
	6	rc	ul		1		0	1	0
	9	rc	ul		1		0	1	0
	8	rc	lb		0		0	0	0
	10	rc	lb		0		0	0	0
	14	rc	lb		0		0	0	0
	25	sn			0		0	0	0
	27	rc			0		0	0	0
	27	rc	re		0		0	0	0
	38	sn			0		0	0	0
10	1	rc		1			1	0	0
	7	rc	co	4			4	0	0
	16	rc		0			0	0	0
	25	rc		0			0	0	0
	39	rc		0			0	0	0
11	0	rc	fu		40		0	57	0
	11	sn	elg		50		0	66	0
	12	sn	elg		12		0	15	0
	13	sn	elg		14		0	18	0
	14	sn	elg		15		0	19	0
	16	sn			20		0	19	0
	16	sn			2		0	2	0
	16	sn	hir		0		0	0	0
	17	gv	hir		0		0	0	0
	17	sn	hir		0		0	0	0
	18	sn	hir		0		0	0	0
	18	sn	hir		1		0	1	0
	20	sn	hir		1		0	1	0
	21	sn	hir		0		0	0	0
	22	sn	hir		1		0	1	0
	24	sn	hir		0		0	0	0
	25	sn	lb		0		0	0	0
	26	sn	hir		0		0	0	0
	27	sn	hir		0		0	0	0
	28	sn	hir		0		0	0	0
12	0	bl	fu			0	0	0	0
	7	bl	fir			15	0	0	16
	11	bl	re			20	0	0	22
	14	shl	lb			10	0	0	11
	17	rc	la			70	0	0	76
	21	shl	lb			25	0	0	28
	27	shl	lb			50	0	0	56
	28	gv	lb			12	0	0	13
	28	cbl	lb			80	0	0	90
	28	gv	lb			15	0	0	16
	28	gv	lb			15	0	0	17
	28	cbl	lb			60	0	0	67
	28	sn				0	0	0	0
	28	sn	lb			80	0	0	90
	26	sn	lb			5	0	0	6
	24	sn				0	0	0	0
	20	sn				0	0	0	0
	17	rc				0	0	0	0
	13	rc				0	0	0	0
	12	rc				50	0	0	55
	0	rc	fu			20	0	0	22

Table 6b. (page 2 of 3).

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	3	rc	fu			15	0	0	16
	6	rc	fu			10	0	0	10
	0	rc	fu			0	0	0	0
13	0	rc	fu		0		0	0	0
	3	rc	fil		6		0	6	0
	7	rc	lb		0		0	0	0
	15	rc	lb		0		0	0	0
	19	sn	hir		1		0	1	0
	19	bl	hir		0		0	0	0
	16	rc			0		0	0	0
	18	rc			0		0	0	0
	23	sn			0		0	0	0
	24	bl			0		0	0	0
	25	rc			0		0	0	0
	28	cbl			0		0	0	0
14	0	rc		0			0	0	0
	8	rc	fir	14			15	0	0
	9	rc		7			7	0	0
	8	rc	fir	8			9	0	0
	8	rc		0			0	0	0
	19	rc		1			1	0	0
	32	rc		0			0	0	0
15	7	rc		0			0	0	0
	14	rc		1			1	0	0
	20	rc	lb	6			9	0	0
	20	rc	lb	0			0	0	0
	26	rc		3			3	0	0
	31	rc		10			10	0	0
	34	rc	lb	65			96	0	0
	37	rc		20			21	0	0
	39	cbl		15			16	0	0
	41	cbl	lb	25			37	0	0
	43	bl		20			21	0	0
	46	gv		30			32	0	0
	52	rc		45			48	0	0
	56	sn		0			0	0	0
	59	gv		0			0	0	0
16	6	rc	fir	20			21	0	0
	9	rc	fu	16			24	0	0
	14	rc	lb	30			44	0	0
	16	bl	lb	10			15	0	0
	18	rc	fir	7			7	0	0
	27	rc	lb	50			74	0	0
	27	rc	lb	40			59	0	0
	27	rc	fir	10			11	0	0
	29	rc		45			48	0	0
	32	bl		2			2	0	0
	33	gv		1			1	0	0
	33	gv		0			0	0	0
	32	gv		3			3	0	0
	33	sn		5			5	0	0
	32	sn		20			21	0	0
	33	sn	lb	4			6	0	0
	32	sn	lb	8			12	0	0
17	0	rc	lb	0			0	0	0
	10	rc	lb	6			9	0	0
	10	rc	lb	1			1	0	0
	12	rc	la	55			59	0	0
	15	rc	la	2			2	0	0
	19	rc	la	45			48	0	0
	22	rc	la	10			10	0	0
	23	rc	la	60			64	0	0
	27	rc	la	8			9	0	0

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	30	rc	la	25			27	0	0
	32	cbl	lb	3			4	0	0
	34	cbl	lb	0			0	0	0
	34	rc	lb	5			7	0	0
	35	cbl	lb	1			1	0	0
	36	cbl		0			0	0	0
	37	cbl	lb	4			6	0	0
	38	cbl	lb	25			37	0	0
	39	cbl	lb	8			12	0	0
	38	cbl		6			6	0	0
	40	cbl		20			21	0	0
	40	cbl	lb	4			6	0	0
	41	cbl	lb	15			22	0	0
	42	cbl	re	60			64	0	0
	43	cbl	lb	30			44	0	0
	44	cbl		0			0	0	0
	44	cbl		0			0	0	0
18	0	rc			0		0	0	0
	8	rc			30		0	28	0
	10	rc	fir		20		0	18	0
	10	rc			16		0	14	0
	12	rc			12		0	11	0
	13	rc			80		0	74	0
	12	rc			17		0	15	0
	13	rc			20		0	19	0
	14	rc			8		0	7	0
	14	rc			5		0	5	0
	14	rc			2		0	2	0
	14	rc			9		0	8	0
	14	rc			15		0	14	0
	14	rc			1		0	1	0
	14	rc			7		0	7	0
	14	rc			3		0	3	0
	15	rc			1		0	1	0
	15	gv	lb		7		0	8	0
	15	cbl			2		0	2	0
	15	cbl	lb		3		0	4	0
	14	rc	fir		20		0	19	0
	14	rc	fir		13		0	12	0
	14	rc	fir		26		0	24	0
	15	gv	lb		15		0	18	0
	15	cbl			12		0	11	0
	16	rc			20		0	19	0
	16	gv			2		0	2	0
	17	bl			1		0	1	0
	17	bl			20		0	19	0
19	2	rc	fir		1		0	1	0
	8	rc	elg		14		0	18	0
	14	gv			3		0	3	0
	15	gv			15		0	14	0
	16	cbl	fir		20		0	19	0
	18	cbl			30		0	28	0
	18	bl			7		0	7	0
	17	rc	fir		3		0	3	0
	18	rc	la		4		0	4	0
	20	rc	la		5		0	5	0
	24	gv			4		0	4	0
	25	gv			10		0	9	0
	27	cbl			4		0	4	0
	29	gv			6		0	6	0
	30	gv			7		0	7	0
	33	gv			5		0	5	0
	35	gv			3		0	3	0

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	36	gv			3		0	3	0
	38	gv			1		0	1	0
	40	cbl			2		0	2	0
20	0	rc	fir		40		0	0	43
	12	bl	la		20		0	0	22
	19	shl	lb		20		0	0	22
	26	cbl	lb		20		0	0	22
	34	shl			0		0	0	0
	38	cbl	lb		80		0	0	90
	44	cbl	la		40		0	0	44
	51	cbl	lb		50		0	0	56
	57	cbl	la		30		0	0	33
	64	cbl			0		0	0	0
21	0	rc	re		25		0	0	27
	7	cbl			20		0	0	22
	14	rc	lb		14		0	0	15
	24	shl	lb		30		0	0	34
	31	shl	lb		35		0	0	39
	36	shl	lb		5		0	0	6
	43	rc			15		0	0	16
	50	shl			10		0	0	11
	57	rc	lb		15		0	0	17
	64	cbl			0		0	0	0
22	0	rc	fir	50			54	0	0
	-3	rc		80			86	0	0
	-4	rc		10			10	0	0
	-6	rc		2			2	0	0
	3	rc	fil	10			10	0	0
	5	rc	lb	65			96	0	0
	7	rc	re	20			21	0	0
	10	rc	lb	50			74	0	0
	12	rc	fir	65			70	0	0
	14	rc	lb	11			16	0	0
	15	rc	fil	16			17	0	0
	18	sn	lb	0			0	0	0
	19	sn	lb	0			0	0	0
	20	cbl		2			2	0	0
	20	cbl	lb	6			9	0	0
	21	cbl		0			0	0	0
	21	cbl	fil	1			1	0	0
	22	cbl	lb	3			4	0	0
	23	cbl	lb	0			0	0	0
	24	cbl	lb	2			3	0	0
	24	cbl	lb	1			1	0	0
	25	cbl	lb	6			9	0	0
	25	cbl	lb	7			10	0	0
	25	rc	lb	50			74	0	0
	26	cbl	lb	4			6	0	0
	27	cbl	re	3			3	0	0
	27	cbl	lb	35			51	0	0
	27	bl	ag	10			10	0	0
	26	bl	lb	11			16	0	0
	26	bl	lb	40			59	0	0
23	-4	cbl				60	0	0	65
	-3	bl	fu			10	0	0	10
	0	bl	fir			11	0	0	12
	3	bl	fir			16	0	0	17
	4	gv	re			5	0	0	5
	4	sn	hir			20	0	0	25
	5	sn				1	0	0	1
	5	gv	hir			50	0	0	64
	6	gv	ul			2	0	0	2
	7	gv	lb			3	0	0	3

Table 6b. (page 3 of 3).

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	8	gv	lb			4	0	0	4
	11	gv	lb			1	0	0	1
	14	cbl	lb			4	0	0	4
	17	sn				2	0	0	2
	22	cbl				10	0	0	11
	27	sn				1	0	0	1
	32	cbl				1	0	0	1
	39	cbl	hir			20	0	0	26
	45	cbl				0	0	0	0
24	0	rc		45			48	0	0
	7	bl	fir	24			25	0	0
	9	rc	co	40			42	0	0
	15	bl	co	45			48	0	0
	18	cbl	hir	50			68	0	0
	20	cbl	hir	60			81	0	0
	23	gv		0			0	0	0
	26	gv		2			2	0	0
	29	sn		0			0	0	0
	33	gv	lb	2			3	0	0
	38	gv	lb	30			44	0	0
	43	gv		1			1	0	0
	48	gv	hir	15			20	0	0
	53	cbl		7			7	0	0
	58	gv		5			5	0	0
25	-4	cbl	fu		45		0	64	0
	-4	bl			80		0	74	0
	-6	bl			0		0	0	0
	-6	bl			8		0	7	0
	1	rc	co		20		0	18	0
	7	rc	fir		30		0	27	0
	6	rc	lb		20		0	23	0
	16	rc	lb		20		0	24	0
	24	sn	lb		25		0	30	0
	32	rc			15		0	14	0
	36	sn	lb		80		0	94	0
	40	rc			90		0	84	0
	47	cbl			15		0	14	0
	53	cbl	lb		18		0	21	0
26	-2	bl		0			0	0	0
	-4	bl	fu	11			16	0	0
	-6	bl	fu	10			15	0	0
	3	bl	lb	20			29	0	0
	5	bl	lb	50			74	0	0
	10	cbl	lb	1			1	0	0
	15	cbl	lb	1			1	0	0
	20	cbl	lb	0			0	0	0
	25	cbl		0			0	0	0
	30	cbl	lb	0			0	0	0
	36	cbl		0			0	0	0
	41	cbl		0			0	0	0
27	0	rc	fir	45			48	0	0
	6	bl	lb	6			9	0	0
	11	rc	re	30			32	0	0
	18	rc	lb	30			44	0	0
	26	sn	lb	40			59	0	0
	31	sn	lb	0			0	0	0
	39	sn		0			0	0	0
	45	sn		0			0	0	0
28	-4	bl		40			43	0	0
	0	bl	fir	35			37	0	0
	11	bl	hir	50			68	0	0
	18	bl		10			11	0	0
	26	bl	lb	1			1	0	0
	33	sn	lb	3			4	0	0

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	41	cbl	lb	4			6	0	0
	48	cbl	lb	0			0	0	0
29	1	bl		40			43	0	0
	4	bl	fu	30			45	0	0
	7	bl		30			32	0	0
	7	bl	elg	20			23	0	0
	8	bl	elg	25			29	0	0
	9	bl	elg	80			93	0	0
	12	bl	fir	16			17	0	0
	12	bl	co	80			86	0	0
	14	bl	fir	15			16	0	0
	16	bl	fir	40			43	0	0
	17	bl	co	1			1	0	0
	18	bl		0			0	0	0
	19	cbl	hir	3			4	0	0
	21	bl	lb	0			0	0	0
	22	cbl	fir	20			21	0	0
	23	cbl	fir	20			21	0	0
	25	cbl		4			4	0	0
	27	cbl		1			1	0	0
	28	cbl		4			4	0	0
	29	cbl	fir	1			1	0	0
	30	cbl	fir	1			1	0	0
	31	cbl		0			0	0	0
	33	cbl		0			0	0	0
	34	cbl		0			0	0	0
	35	gvl		0			0	0	0
30	-1	bl			3		0	3	0
	0	rc	fu		50		0	72	0
	1	bl	fu		25		0	36	0
	3	bl	fir		80		0	74	0
	8	sn	co		15		0	14	0
	10	sn	hir		40		0	55	0
	12	sn	hir		16		0	22	0
	14	sn	lb		15		0	18	0
	16	bl	hir		15		0	21	0
	18	bl	co		13		0	12	0
	20	bl	lb		20		0	24	0
	22	sn	hir		20		0	27	0
	24	sn	lb		8		0	9	0
	27	sn			0		0	0	0
	28	sn	hir		1		0	1	0
	29	sn	elg		3		0	4	0
	30	sn	elg		4		0	5	0
	31	sn			1		0	1	0
	32	sn			3		0	3	0
	34	sn			4		0	4	0
	36	sn			2		0	2	0
	39	sn			1		0	1	0
	43	sn			0		0	0	0
31	-	gvl			3		0	3	0
	-	gvl			1		0	1	0
	-	gvl			0		0	0	0
	-5	sn			0		0	0	0
	-3	sn			27		0	25	0
	-2	sn			60		0	56	0
	0	sn			20		0	19	0
	1	sn			5		0	5	0
	1	sn	fu		3		0	4	0
	1	sn	elg		0		0	0	0
	1	sn			0		0	0	0
	2	sn	elg		16		0	21	0
	2	sn	elg		12		0	15	0
	3	sn	elg		14		0	18	0

Transect	depth	Bottom	Vegetation	DG eye	BD eye	RL eye	DG cor	BD cor	RL cor
	4	sn	elg		14		0	18	0
	5	sn	elg		90		0	11	0
	9	sn	elg		6		0	8	0
	10	sn	elg		5		0	7	0
	12	sn	lb		0		0	0	0
	14	sn	lb		1		0	1	0
	16	sn	lb		0		0	0	0
	18	sn			0		0	0	0
	20	sn			0		0	0	0
	23	sn			0		0	0	0
3	0	rc	fu			0	0	0	0
	7	bl				0	0	0	0
	14	bl	lb			0	0	0	0
	21	bl	lb			0	0	0	0
	27	cbl	lb			40	0	0	45
	34	bl	lb			20	0	0	22
	43	sn	lb			15	0	0	17
	52	sn	lb			1	0	0	1
	58	sn				0	0	0	0
3	0	rc				0	0	0	0
	3	bl				0	0	0	0
	7	bl	lb			1	0	0	1
	11	cbl				1	0	0	1
	12	sn	lb			0	0	0	0
	12	cbl				0	0	0	0
	10	rc	hir			10	0	0	13
	5	rc	hir			5	0	0	6
	2	rc	cor			5	0	0	5
	12	rc	hir			10	0	0	12
	7	rc				1	0	0	1
	8	rc				0	0	0	0
	19	rc				5	0	0	5
	33	rc				20	0	0	22
	42	rc				0	0	0	0
	54	rc				0	0	0	0
3	0	rc	fu		40		0	57	0
	8	rc			40		0	37	0
	13	sn	lb		30		0	35	0
	13	shl	elg		7		0	9	0
	13	sn	elg		25		0	33	0
	13	sn	elg		12		0	16	0
	14	sn	elg		10		0	13	0
	15	sn	lb		20		0	24	0
	16	sn	elg		25		0	33	0
	17	sn	elg		25		0	33	0
	18	sn	elg		3		0	4	0
	19	sn			2		0	2	0
	20	sn	elg		35		0	46	0
	22	sn			5		0	5	0
	24	sn			1		0	1	0
	26	sn			2		0	2	0
	28	sn			3		0	3	0
	29	sn	lb		12		0	14	0
3	-1	bl	fu		80		0	11	0
	1	bl	co		14		0	13	0
	5	bl	co		60		0	56	0
	13	bl	cor		80		0	74	0
	16	cbl	cor		40		0	37	0
	19	cbl			45		0	42	0
	22	cbl			15		0	14	0
	25	sn			1		0	1	0
	29	sn	lb		1		0	1	0
	33	sn			0		0	0	0
	38	sn			0		0	0	0

Table 7. Comparison of herring spawning success inside and outside Sitka harbor, 1993-1997.

Year of Spawn	Location	Miles of spawn	Total egg depostion	Proportion of egg deposition	Egg density
1993	inside	1.0	154,863,314,000	0.052	313,182
	outside	49.0	2,796,877,937,583	0.948	340,086
1994	inside	1.0	61,824,575,200	0.047	167,752
	outside	57.1	1,262,367,517,410	0.953	232,198
1995	inside	1.0	86,097,257,600	0.027	273,464
	outside	34.5	3,082,107,590,550	0.973	517,296
1996	inside	1.0	64,875,004,400	0.020	269,459
	outside	44.6	3,238,992,165,312	0.980	371,989
1997	inside	1.0	47,386,723,968	0.022	138,097
	outside	31.8	2,137,649,691,629	0.978	384,826
1998	inside	1.0	84,787,338,000	0.026	277,464
	outside	61.3	3,140,755,870,000	0.974	340,622

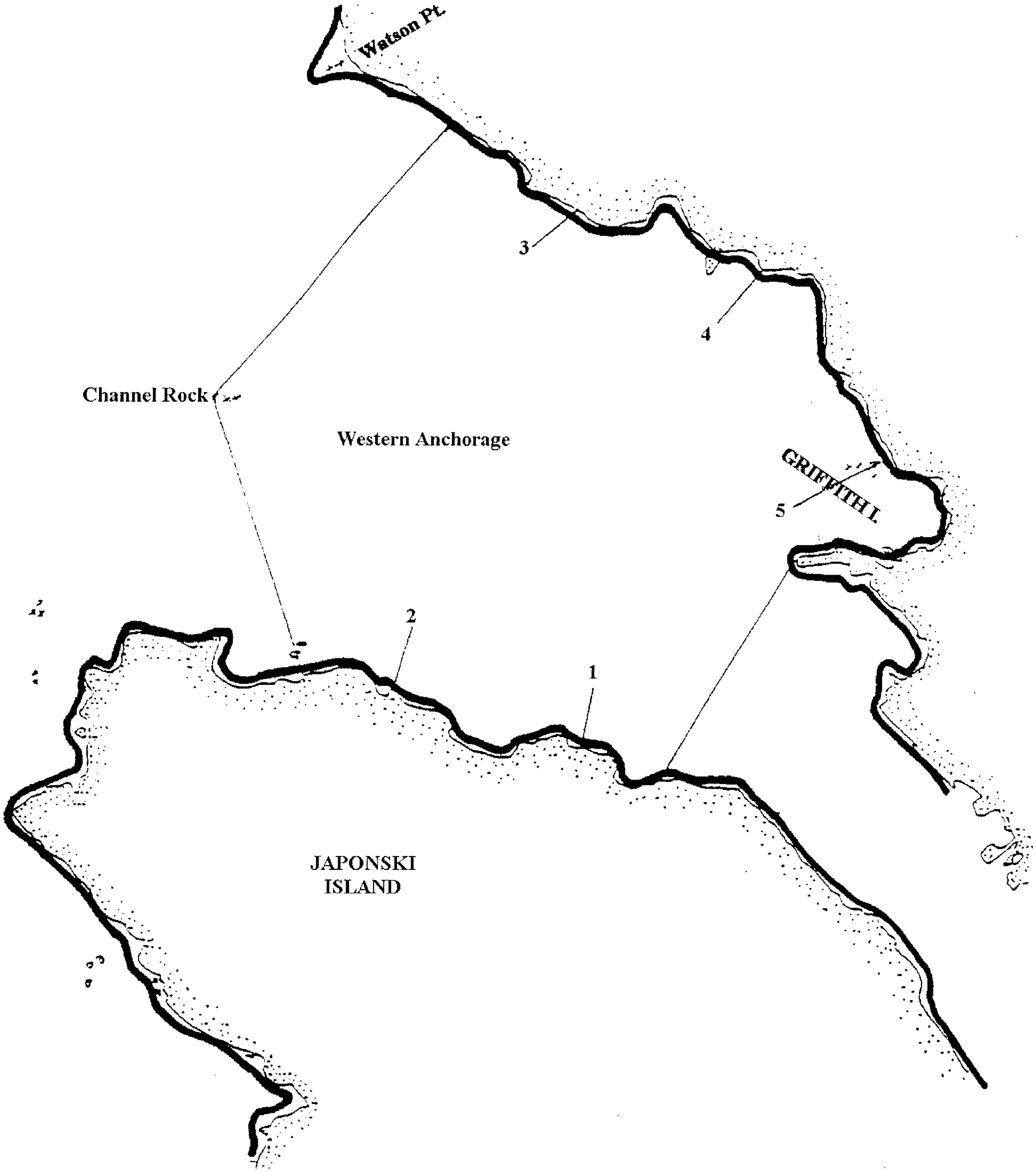

Figure 1a. Shoreline receiving herring spawn (bold line) and transect locations in Sitka Harbor, 1997.

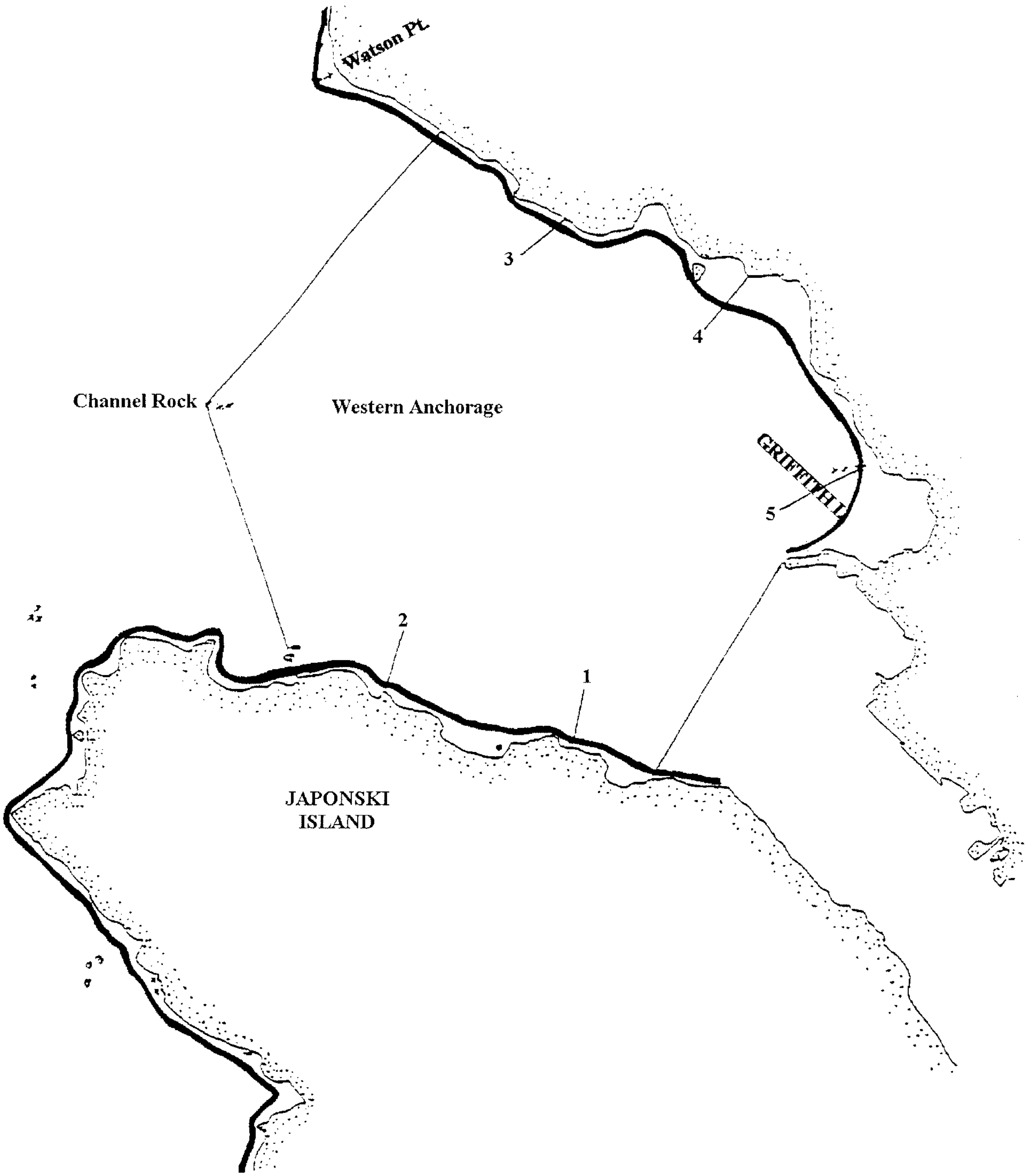

Figure 1b. Shoreline receiving herring spawn (bold line) and transect locations in Sitka Harbor, 1998.

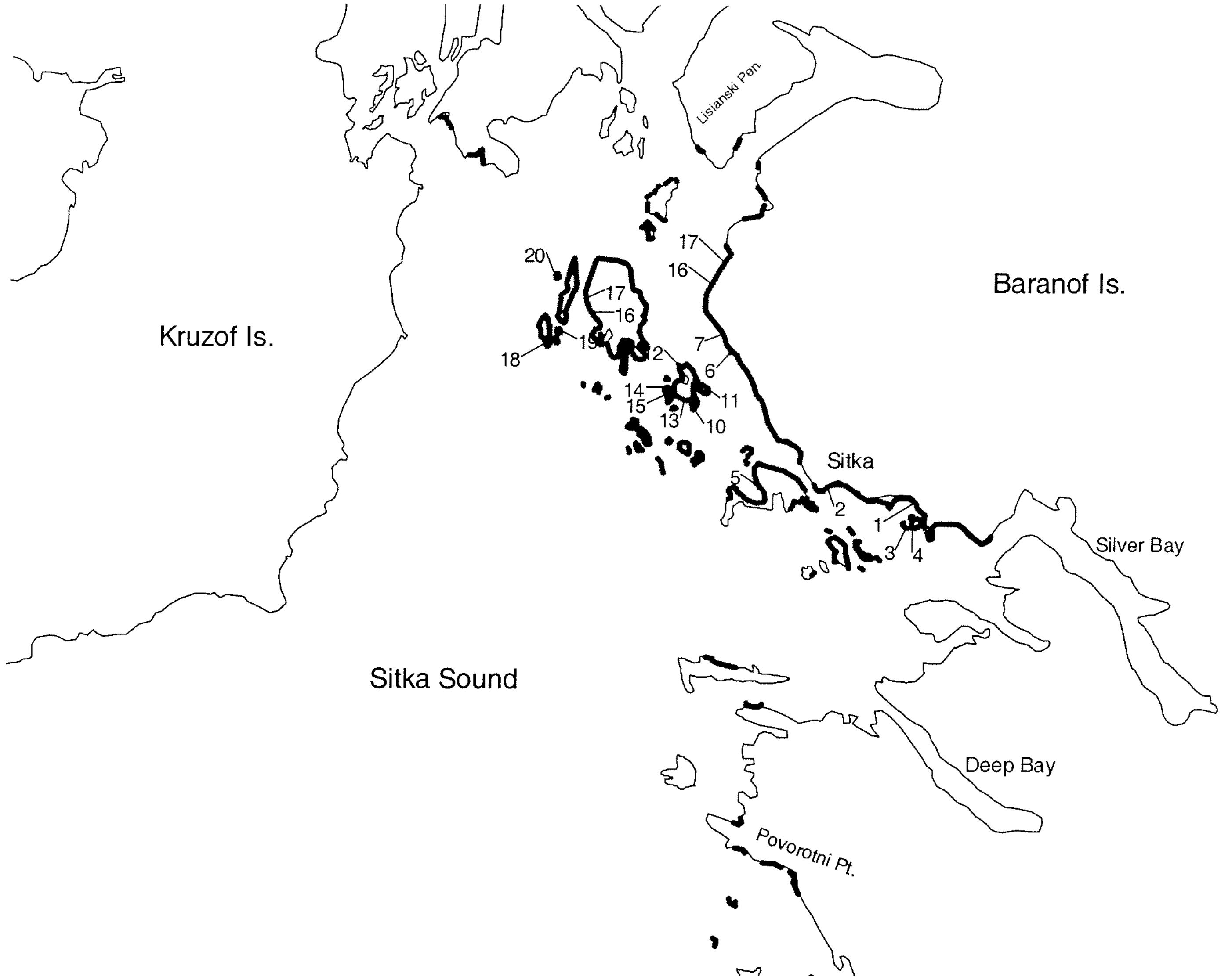

Figure 2a. Shoreline receiving herring spawn (bold line) and transect locations in Sitka Sound, 1997.

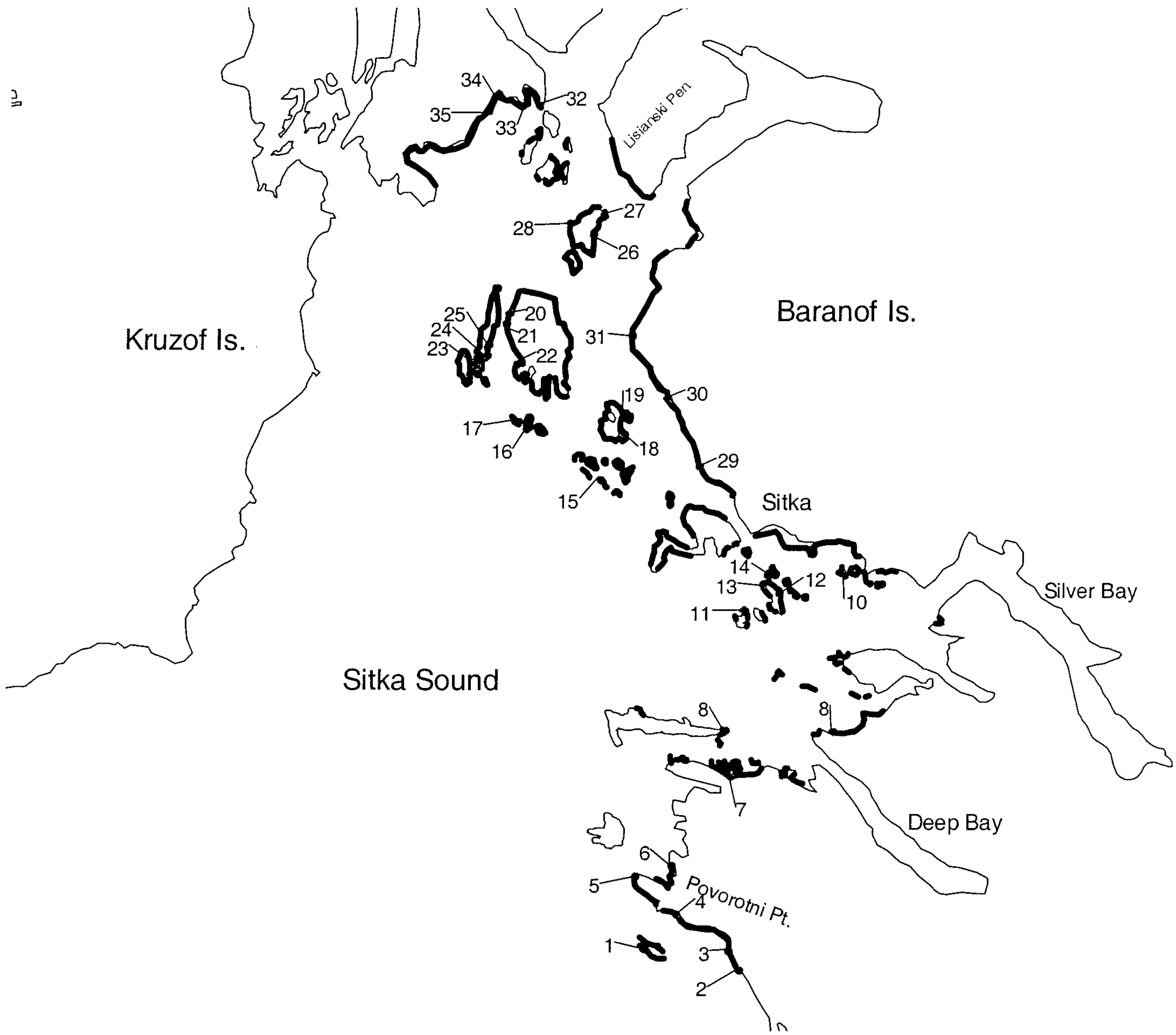

Figure 2b. Shoreline receiving herring spawn (bold line) and transect locations in Sitka Sound, 1998.

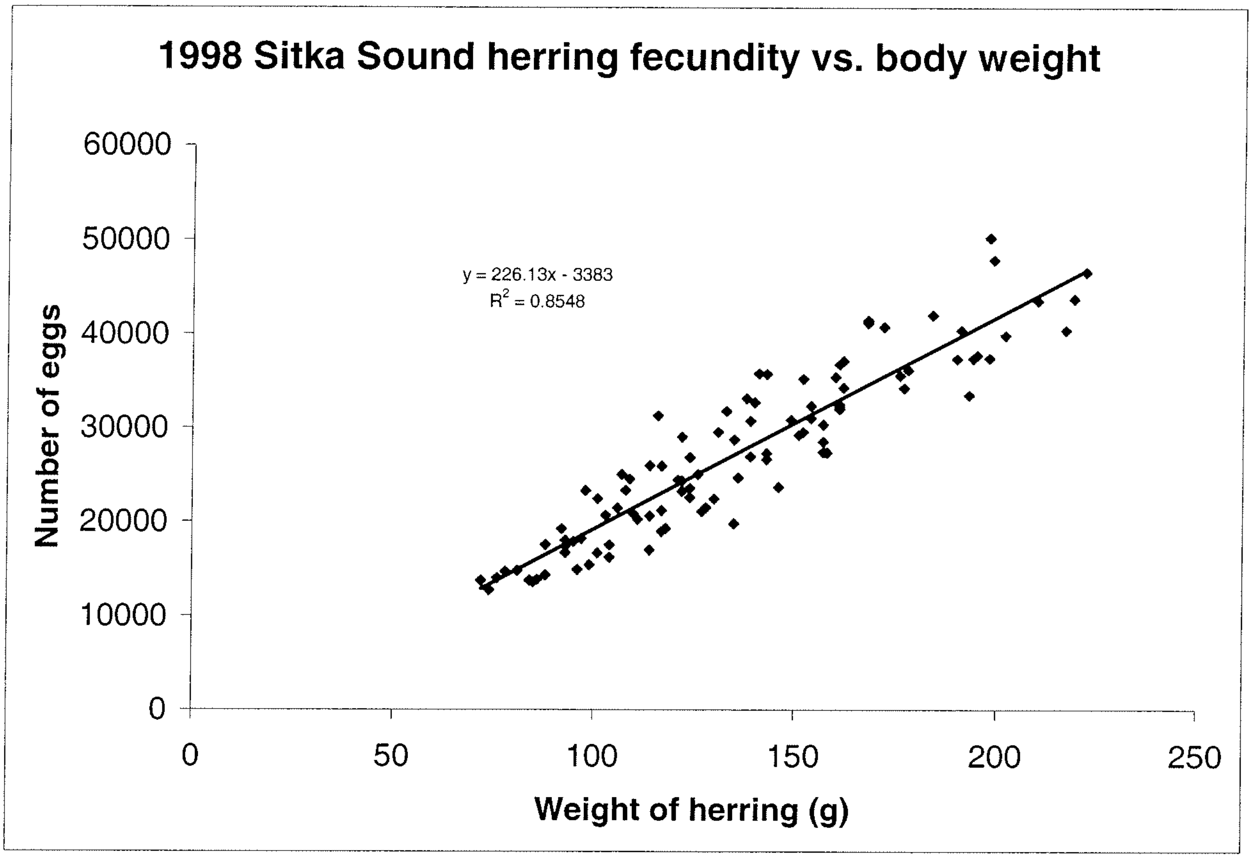

Figure 3. Relationship between herring fecundity and body weight for Sitka Sound, 1998.

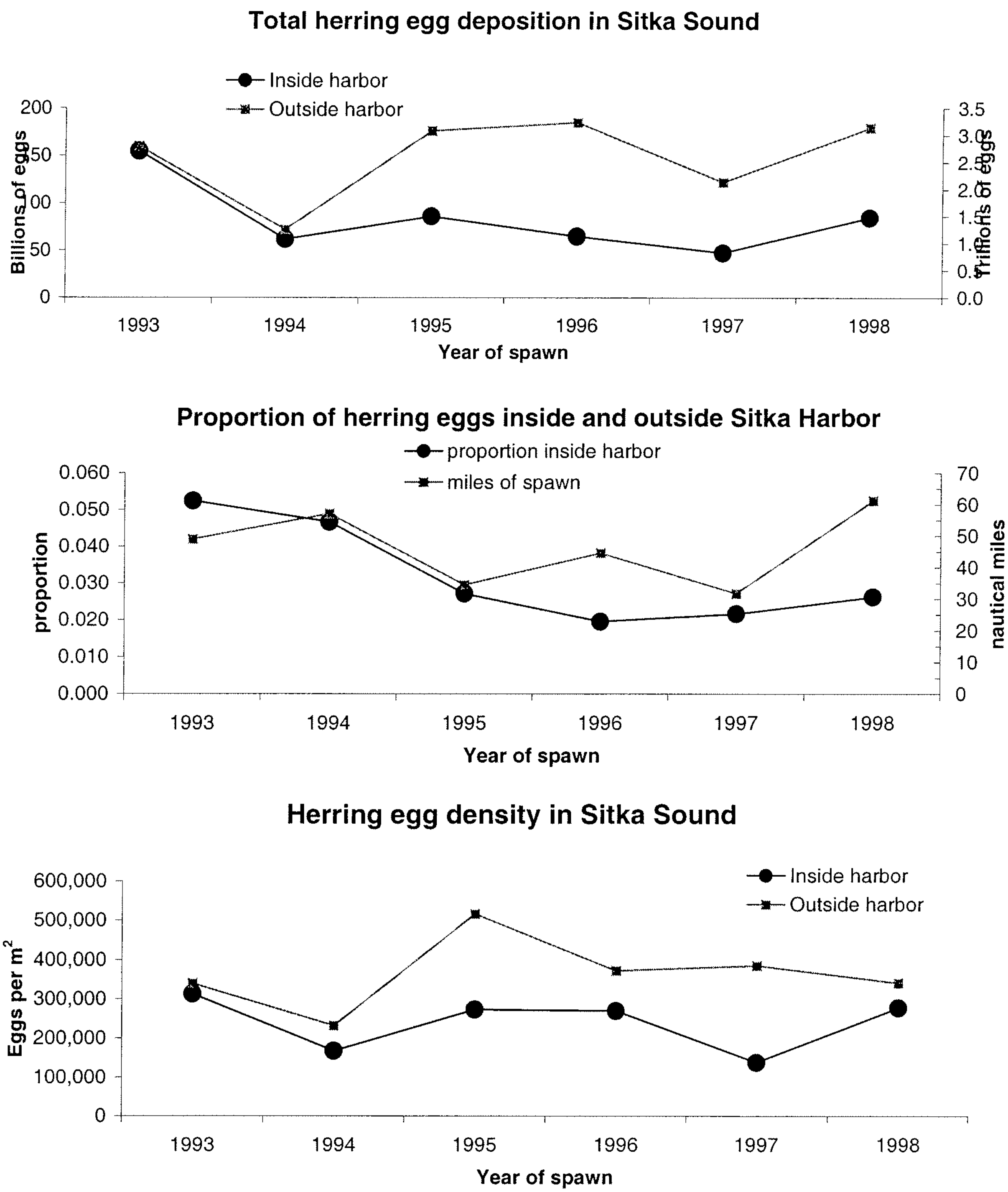

Figure 4. Total herring egg deposition and egg density inside and outside Sitka Harbor, 1993-1998.

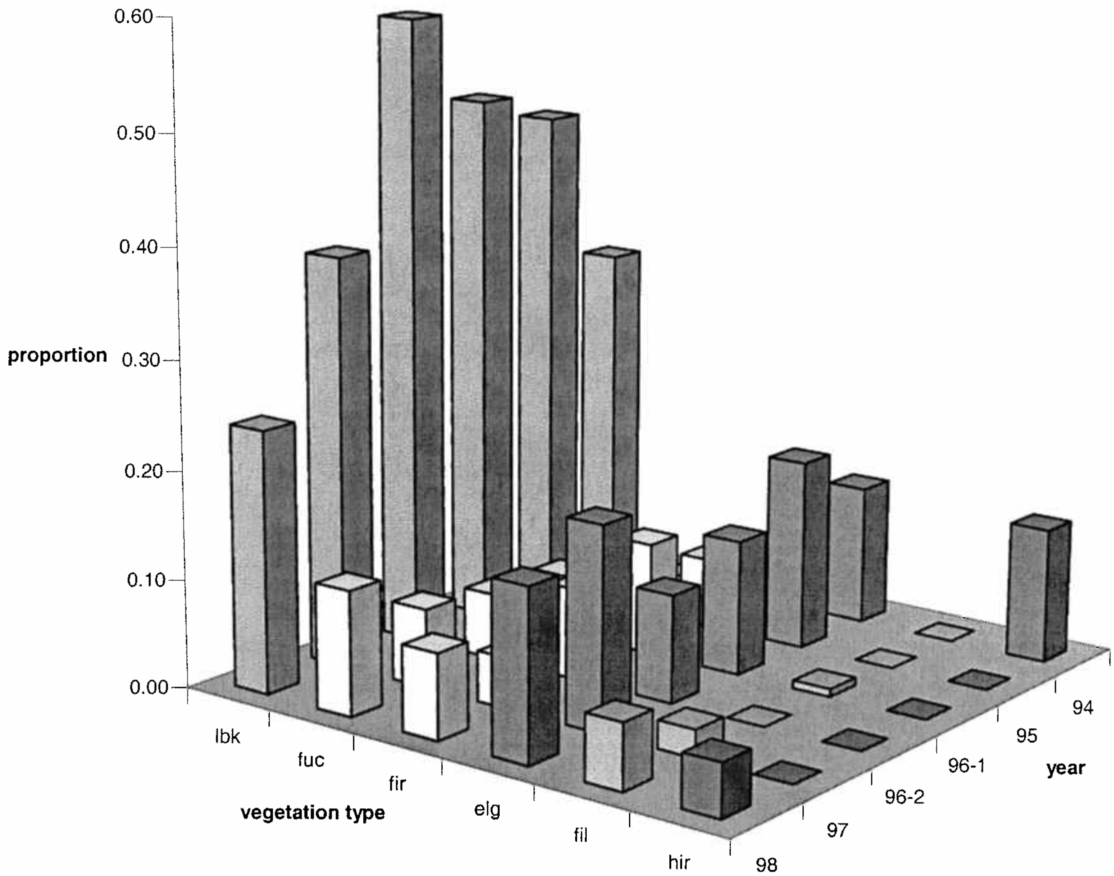

Figure 5. Sitka boat harbor primary vegetation types, pooled for transects P1-P5. 1996 first and second surveys are shown for comparison only. See Table 3 for vegetation codes.

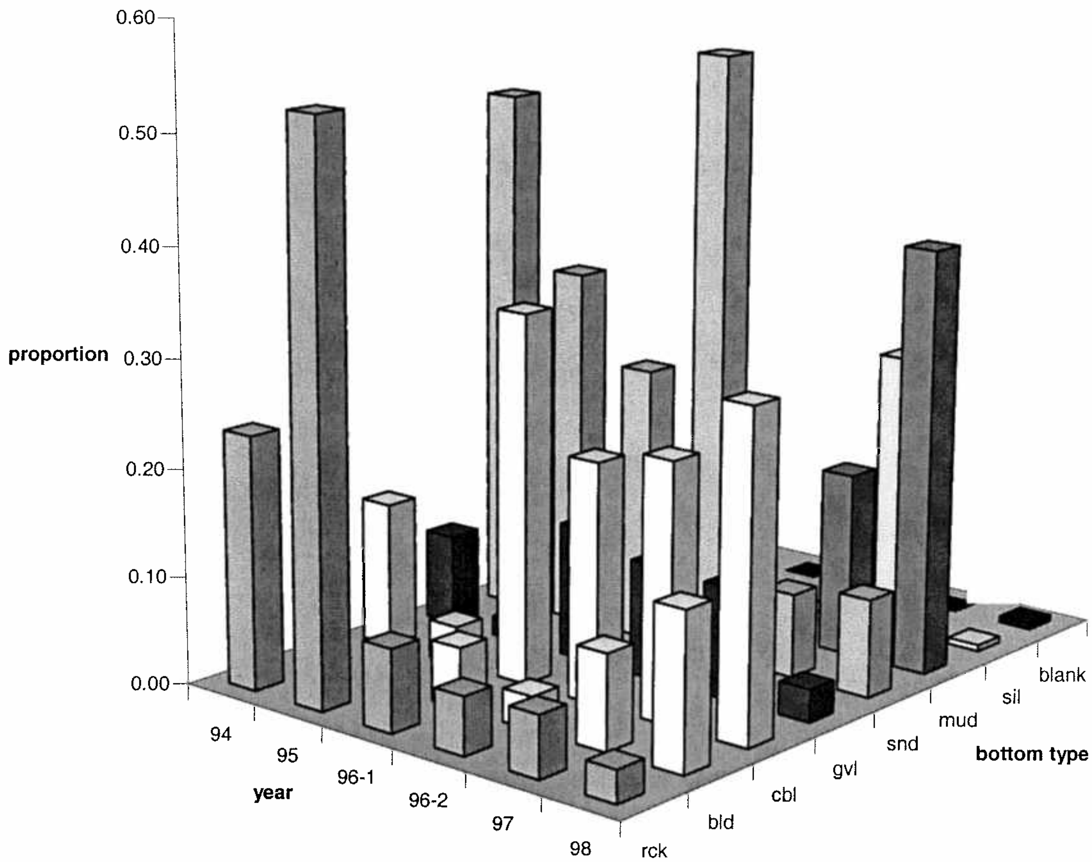

Figure 6. Sitka boat harbor bottom types, pooled for transects P1-P5. 1996 first and second surveys are shown for comparison only. See Appendix C for bottom type codes.

Appendix A. Sitka Sound herring aerial and skiff surveys, 1997.

3-10 710 sea lions on offshore haul-out rocks S of Biorka Island; 272 sea lions scattered throughout Sitka Sound.

3-12 830 sea lions on offshore haul-out rocks;180 sea lions in areas N of Sitka Sound.

3-14 300 sea lions in Sitka Sound, most in the areas N of Sitka Sound, W of Middle Island and near Inner Point.

3-15 540 sea lions in Sitka Sound with large concentration in Hayward Strait.

3-16 542 sea lions in Sitka Sound, 190 in Crow Pass, 110 off Chaichei Rocks, 80 in Hayward Strait, and 60 off Inner Point. S side of Crow Pass very active with birds.

3-17 Sea lion distribution similar to yesterday; more concentrated in Hayward Strait and less in Crow Pass.

3-18 250 sea lions on Kruzof shore scattered from Fred's Creek to Brent's Beach. Approximately 2,000 tons of herring spotted just N of Inner Point. 150 sea lions off Chaichei Island. Two balls (20 and 100 ton) between pulp mill and Entry Point.

3-19 0.8 nm of **active spawn** on E side of Hayward Strait. Groups of sea lions scattered between Hayward Strait and Inner Point. 40 sea lions scattered among the Galankin Island group.

3-20 **Spawn dissipating** in Hayward Strait. Large schools S of Rob Point. 200 ton school in Promisula Bay. Two large schools in mouth of Silver Bay. 200 sea lions off Jamestown Bay. Three good schools in Crescent Bay (1,000 tons).

3-21 No spawn. One school (200 ton) in Jamestown as well as 100 sea lions. Good school off Indian River flat and a ball inside Marshall Island. S Krestof Sound has 200 sea lions and large schools of herring near the Magoun Islands.

3-22 **Active spawn** off Halibut Point (0.95 nm). No spawn elsewhere. Large concentration of sea lions in Krestof/Hayward area and off Jamestown Bay.

3-23 Sea lions along islands N of Eastern Channel. 3 nm of **active spawn** in Halibut Point area. No other spawn seen.

3-24 Light **dissipating spawn** on Halibut Point (1.7 nm). **Spot spawn** N of Sandy Beach and a **light spot** off Kasiana Island. Numerous large schools around Kasiana Island and Middle Island.

3-25 **Active spawn** Kasiana Island (2.4 nm), Apple Island (0.5 nm), and Halibut Point Road (2.5 nm).

3-26 Numerous large schools seen in Crescent Bay, Western Channel and Whiting Harbor. **Active spawn** Halibut Point (3.5 nm), Japonski (0.4 nm), Kasiana (2.4 nm), Apple Island/Parker Group (1.2 nm). Total active spawn 8.2 nm.

3-27 **Spawn beginning** on S side of town along Indian River flat with large stringers of fish holding off the spawn. **Spawn expanding** in Whiting Harbor and **spawn beginning** on Middle Island. Total cumulative spawn to date 15.0 nm.

3-28 **Active spawn** along E and S sides of Middle Island (5.25 nm), Kasiana (2.0 nm), Apple/Parker Group (1.25 nm), Japonski (0.7 nm), and S of the bridge (2.2 nm). A spot on Gavanski Island. Total active spawn 11.4 nm.

3-29 Nothing seen S of Eastern Channel. Three sea lions in Salisbury Sound. **Active spawn**: Kasiana (2.7 nm), Middle Island (4.5 nm), Crow Island (0.7 nm), Apple/Parker Group (1.2 nm), Jamestown and Crescent Bays (2.3 nm), and Japonski (1.3 nm). Total active spawn 12.7 nm.

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3-30 Except for one small school in Aleutkina Bay, quiet S of Eastern Channel. **Spawn expanded** in Jamestown and on S Japonski Island along E-side of runway. **Spawn starting** on Gagarin and expanding on Crow Island. **Spawn** on Kasiana still active but dissipating. Total active spawn 17.5 nm.

3-31 **Active spawn** S of the bridge on Twin Is., E-side of runway, Jamestown Bay, Whiting Harbor, Gavanski, Gagarin, Middle, Crow, Chaichei, and Apple Islands. **Active spawn**, 3.7 nm S of bridge and 13.7 N.

4-2 **No active spawn** in Sitka Sound.

4-3 Surveyed S to Whale Bay – no herring or predators seen. **Spawn beginning** on NW Middle Island, and a **light spawn** in Crow Pass.

4-4 20-30 tons of herring in Aleutkina Bay N of Deep Inlet. **Spawn** at Twins and Morne Island. Five grey whales off Cape Edgecumbe. **Small spawn** on Big and Little Gavanski Islands.

4-5 Three balls of herring in Leesofskia Bay, two humpbacks off Middle Island and one humpback in Middle Channel. **No spawn seen.**

4-6 Two balls in Leesofskia as well as 30 tons in bait pound. A 10 ton ball E of Berry Island. **Small spawns** on Galankin, Kutkan, Morne and Katz Islands. **Spawn** on the NW side of Gavanski. Total of 0.7 nm active spawn. Total cumulative to date 32.8 nm.

4-7 **Active spawn** on Morne, Galankin, Twins, and Katz Islands for 1.25 nm.

4-8 Three **spots** on Galankin Is., one **spot** on Whale Is., and a **spot** on Battery Is. .

4-9 **Spawn** on the E-side of Galankin Is. A one ton ball of herring E of Berry Is. 2,000 scoters N of Apple Is.

4-10 Surveyed Sitka Sound and outer coast of Kruzof Is. Five grey whales off Cape Edgecumbe. **Spot spawn** in Leesofskia Bay. No other events.

4-11 Surveyed down to Whale Bay. No active spawn seen.

4-12 0.1 nm **active spawn** in Leesofskia opposite the bait pound. 20 sea lions at Sugarloaf Mt.

4-13 No survey.

4-14 Surveyed to West Crawfish Inlet. 0.2 nm **active spawn** near Kizhuchia Creek in Redoubt Bay. Several good schools in Leesofskia Bay, and a **spot spawn** in Thimbleberry Bay at the creek inlet.

4-15 300 yards of **active spawn** in Thimbleberry Bay, and a spot near Kizhuchia Creek. .

4-16 **Spawn expanding** in Thimbleberry Bay including E-side of Harris Is. to Entry Point. 0.25 nm of **intense spawn** on N side Long Island, **active spawn** in Pirates Cove, near Kizhuchia Cr., Korga Island, and Taigud Island. And **spawn developing** in Starrigavin Bay for a total of 2.3 nm active spawn.

4-17 **Active spawn** continuing in Thimbleberry Bay, Long Is., and Pirates Cove. **Spawn continuing** at Kizhuchia Cr. and on Korga Is. **Spawn expanding** in Starrigavin Bay. Total active spawn 3.0 nm.

4-18 Surveyed S to West Crawfish. **Spawn dissipating** in Thimbleberry Bay. Long Is. continues to have **heavy active spawn**, Pirates Cove has a **medium spawn** with Kizhuchia, Starrigavin, and Eastern Bay having **light active spawn**. Total active spawn 1.55 nm.

4-19 Surveyed S to Whale Bay. 0.1 nm of **active spawn** at Kizhuchia Cr. **Active spawn** SE side of Dorothy Narrows and Herring Bay for 0.3 nm. 0.2 nm **active spawn** in Starrigavin Bay. Nothing seen in Whale or Necker Bays. Total active spawn 0.6 nm.

-continued-

4-20 0.4 nm **active spawn** in Dorothy Narrows, 0.2 nm **active spawn** at Kizhuchia Cr., and 0.1 nm **active spawn** in Starrigavin Bay.

4-21 No active spawn seen.

4-22 No active spawn seen.

4-23 **Active spawn** on Guertin Is. and in Thimbleberry Bay for 1.1 nm. 0.15 nm of spawn in bite N of Povorotni Pt. **Active spawn** in Katlian Bay, Nakwasina, Lisianski Pt. area for 0.5 nm.

4-24 **Active spawn** on Guertin Is. (0.3), and dissipating in Thimbleberry Bay (0.15). New spawn in Big Bay (0.1), and **spawn** at the head of Herring Bay (0.1). Also had **small spawns** in Thompson Harbor (0.1), the Cove (0.15), S side of Middle Is., Ferry Terminal, and on Lisianski Peninsula,

4-25 **Light spawn** on Dangle Is., **spawn** in Big Bay, Herring Bay, and a **spot** in Dorothy Narrows, and a **spot** at the Ferry Terminal.

4-26 100 yards of **light spawn** on Cannon Is., a **spot** in Whiting Harbor, and a **spot** at the Ferry Terminal.

4-30 Surveyed to Whale Bay; no evidence of spawn in Whale or Necker Bays. No herring or spawn seen elsewhere in Sitka Sound.

Appendix B. Sitka Sound herring aerial and skiff survey, 1998.

3-10 770 sea lions on offshore haul-out rocks west and south of Biorka Island. 407 sea lions in Sitka Sound including 225 off Viskari Rocks, 100 off Inner Point, and scattered smaller groups throughout north Sitka Sound.

3-12 480 sea lions on offshore haul-out rocks and 670 in Sitka Sound including 590 from Inner Point to Hayward Strait. Large school of herring off Entry Point.

3-14 Limited survey due to poor weather conditions. Several hundred tons of herring were observed from Entry Point to Harris Island.

3-15 A large biomass of herring was observed in Silver Bay (many thousand tons) from the pulp mill to Bear Cove. A small school in Thimbleberry Bay and off Marshall Island, several good schools in Jamestown Bay, two good schools just inside breakwater, one school off Halibut Point, two good schools in Cedar Cove in Katlian Bay, and a large school of Eastern Point. 400 sea lions from Inner Point to Mountain Point and 40 sea lions north of Crow Pass.

3-16 A large biomass of herring remains in Silver Bay centered at Bear Cove with schools from the pulp mill to the head of Silver bay. Good schools off Jamestown Bay. A large school off the west breakwater. Large numbers of sea lions along the Inner Point shoreline.

3-17 Some schools seen in Eastern Channel, off Indian River, and a large school in Sitka Channel. Also schools scattered from the breakwater to Halibut Point and one school of Harbor Point.

3-18 Several schools off Cannon Island, in Crescent Bay and in Sitka Channel. A large school along the eastern shore of Middle Island and a school off Crosswise Island. 17 sea lions on the south entrance to Neva Strait and 110 sea lions on the north side of Middle Island.

3-19 Still a large biomass in Silver Bay. Good schools scattered from the southeast side of runway through the channel to the breakwater. Scattered smaller schools from the breakwater to Halibut Point. Small schools scattered around the Gavanskis and two schools inside the Siginaka Islands. Two schools off Silver Point and one in Aleutkina Bay. 20 sea lions off Eastern Point and 50 sea lions in Eastern Bay. **First spawn on southwest side of Middle Island (0.3 nm).**

3-20 Still a large biomass in Silver Bay. Large schools leading the beach from Harris Island through Jamestown Bay, Crescent Bay and through Sitka Channel. Large schools in Whiting Harbor, and south of Charcoal Island. Schools also noted north of the breakwater, around Kasiana, little Gavanski, Lisianski Point, Crosswise Island, Chaichei and Parker Islands. **Active spawn expanded on the southwest side of Middle Island, spawn beginning on southeast Crow Island, and at Halibut Point for a total of 2.2 nm of active spawn.**

3-21 Active spawn on the Halibut Point Road System, Middle Island, Crow Island, Gagarin Island, Kasiana Island, Apple Islands, Little Gavanski Island, Crescent Bay and on the south side of the causeway for a total of 14.0 nm of active spawn. Schools of herring noted south of the causeway and in Crescent bay.

3-22 Spawn continues to expand in all areas receiving spawn yesterday with new areas including Big Gavanski, Lisianski Point, Eastern Bay, and the north side of the causeway. Total active spawn includes 24.8 nm on the north side and 2.7 nm in Crescent Bay.

3-23 Spawn continues to expand both on the north side and the south side north of Eastern Channel. A spawn developing at Redoubt Bay near Kishuchia Creek (0.2 nm) for a total of 35.7 nm of active spawn.

3-24 Spawn dissipating in most areas with expanding spawn in Eastern Bay, Starrigavin Bay, Redoubt Bay, Aleutkina Bay, and Jamestown Bay. Total active spawn is 22.7 nm.

-continued-

3-25 Spawn continues to dissipate except expanding spawns in Eastern/Promisila Bay, Redoubt Bay, and Aleutkina Bay. Total Active spawn 8.8 nm.

3-26 Spawn pretty much over on the north side. Spawn expanding in Aleutkina Bay, Long Island, Sandy Cove, Samsing Cove, and Pirates Cove. Total active spawn 5.3 nm.

3-27 Spawn continues in Aleutkina Bay, Long Island, Samsing, and Pirates Cove. Several schools were seen in Windy Pass. Total active spawn 2.4 nm.

3-28 Spawning continues at Long Island, Samsing Cove, Pirates Cove. Active spawn again in Redoubt Bay from Povorotni Point to Kizhuchia Creek. Herring schools in Windy Pass. Total active spawn 3.3 nm

3-29 Poor weather. Spawning on Long Island, Samsing Cove, and Pirates Cove subsiding. A spot on Povorotni Point. 50 sea lions off Frosty Reef and a few in Windy Pass.

3-30 Still spawning in Samsing Cove with 80 sea lions at entrance. Spawn in bite just south of Mielkoi Cove. New active spawn on Korga Island in Redoubt Bay and numerous sea lions present in Redoubt Bay. Total active spawn 1.6 nm.

3-31 Spots of active spawn continue at Long Island, in Samsing Cove and at Povorotni point. Windy Pass has some sea lions. Total active spawn 0.2 nm. Total accumulative 59 nm.

4-3 Spawn continues at Long Island, and on reef outside Samsing Cove. No other spawn observed. Surveyed to Whale Bay. Sea lions off Golf Island in Windy Pass. Total active spawn 0.3 nm.

4-4 No department survey however private pilot reported spawn in Windy Pass from Sevenfathom Bay to Big Bay.

4-7 Active spawn at Dorothy Narrows and between Sevenfathom and Big Bays. Total active spawn 0.8 nm.

4-8 Spawn continues in Windy Pass for a total of 1.1 nm of active spawn.

4-9 Surveyed to Whale Bay. 0.7 nm active spawn in Redoubt Bay along Kizhuchia Creek shoreline and 0.9 nm active spawn in Windy Pass for a total of 1.6 nm.

4-10 New spawn in Katlian Bay (0.2 nm), the causeway (0.2 nm) and Three Entrance Bay (0.2 nm). Spawn continues in Redoubt Bay (1.1 nm) and in Windy Pass (0.2 nm) for a total of 1.7 nm of active spawn.

4-12 Katlian has a spot, Nakwasina Sound at Lisa Creek has 0.25 nm of active spawn, Three Entrance Bay has expanded to 1.5 nm and Redoubt Bay near Kidney Cove has 1.3 nm of active spawn for a total of 3.1 nm.

4-13 Skiff surveyed Redoubt Bay, Dorothy Narrows and Windy Pass adding 0.6 nm. Aerial survey showed no active spawn in the Sitka area.

Appendix C. Key to bottom types used for herring spawn deposition survey.

Code	Expanded code	Definition
RCK	Bedrock	Various rocky substrates > 1 meter in diameter
BLD	Boulder	Substrate between 25 cm and 1 meter
CBL	Cobble	Substrate between 6 cm and 25 cm
GVL	Gravel	Substrate between 0.4 cm and 6 cm
SND	Sand	Clearly separate grains of < 0.4 cm
MUD	Mud	Soft, paste-like material
SIL	Silt	Fine organic dusting (very rarely used)
BAR	Barnacle	Area primarily covered with barnacles
SHL	Shell	Area primarily covered with whole or crushed shells
MUS	Mussels	Area primarily covered with mussels
WDY	Woody debris	Any submerged bark, logs, branches or root systems

Appendix D. Number of encounters of bottom type and total number of quadrat placements for permanent transects in Sitka Harbor, 1994-1998

		Bottom Type								total
Transect	Year	rck	bld	cbl	gvl	snd	mud	sil	blank	estimate number
P1	94	7			5		5			17
	95	14						3		17
	96-1			11		2				13
	96-2	4	1	2		5	1			13
	97	4			7	8				19
	98	4		2		7	2	1	1	17
P2	94	16				17	3			36
	95	37		3	3	2		3		48
	96-1			13	2	12	2			30
	96-2		1		14	7	3			25
	97			11	7	2	5	4		29
	98	1		12	3	1	3			20
P3	94	19		4		18				41
	95	35				1		1		38
	96-1		8	11	5	4				28
	96-2	1	2	26						29
	97		16	30						46
	98		10	31						41
P4	94	1		15	12	20	2			50
	95	2		3		26				31
	96-1	10		14	8	2	3			37
	96-2	1		1		26				28
	97	2	1	5	4	5	27	12		56
	98		7	3		7	31			48
P5	94	4		8		44				56
	95	2				28		6		36
	96-1	1			3	17	8			36
	96-2	1				35				36
	97	5			2		1	35		43
	98		7	2	2		29			40

Appendix E. Number of encounters of vegetation type and total number of quadrat placements for permanent transects in Sitka Harbor, 1994-1998.

		Vegetation Type														total estimate
Transect	Year	lbk	fuc	fir	elg	fil	hir	red	cor	agm	ala	ulv	lam	none	blank	number
P1	94	13	1												3	17
	95	13	1												3	17
	96-1	6	1	1				1	1						3	13
	96-2	10	1	1											1	13
	97	13	1												5	19
	98	5	1	1	1	1									8	17
P2	94	15					13	3							5	36
	95	32	1	5						1					9	48
	96-1	13	4	2				1				1			9	30
	96-2	17	5												3	25
	97	17	3									1		8		29
	98	6	10	1											3	20
P3	94	12			1		7				1				20	41
	95	26	2	3											7	38
	96-1	20	1	5											2	28
	96-2	22		4											3	29
	97	34	2	1		2								5	2	46
	98	21		6		9						2			3	41
P4	94	18		3	15			5			3				6	50
	95	3		3	13										12	31
	96-1	30	2	2	2	1										37
	96-2	23	1	1	2										1	28
	97	5	4	7	8	3		1						29		56
	98	7	5	4	8		7								17	48
P5	94	5			10		5					2	7		27	56
	95	5			17							1			13	36
	96-1	2		5	16										13	36
	96-2	4	1	5	11										15	36
	97	4	4	1	28									6		43
	98	1	3	1	17		1								17	40

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